

Durham E-Theses

Embodiment and Grammatical Structure: An Approach to the Relation of Experience, Assertion and Truth

MALT, ALEXANDER,JAMES

How to cite:

MALT, ALEXANDER,JAMES (2014) *Embodiment and Grammatical Structure: An Approach to the Relation of Experience, Assertion and Truth*, Durham theses, Durham University. Available at Durham E-Theses Online: <http://etheses.dur.ac.uk/10775/>

Use policy

The full-text may be used and/or reproduced, and given to third parties in any format or medium, without prior permission or charge, for personal research or study, educational, or not-for-profit purposes provided that:

- a full bibliographic reference is made to the original source
- a [link](#) is made to the metadata record in Durham E-Theses
- the full-text is not changed in any way

The full-text must not be sold in any format or medium without the formal permission of the copyright holders.

Please consult the [full Durham E-Theses policy](#) for further details.

Academic Support Office, Durham University, University Office, Old Elvet, Durham DH1 3HP
e-mail: e-theses.admin@dur.ac.uk Tel: +44 0191 334 6107
<http://etheses.dur.ac.uk>

Embodiment and Grammatical Structure

An Approach to the Relation of Experience, Assertion and Truth

A thesis submitted for the degree of

Doctor of Philosophy

by

Alexander James Malt

Department of Philosophy

University of Durham

2014

I confirm that no part of the material contained in this thesis has previously been submitted for any degree in this or any other university. All the material is the author's own work, except for quotations and paraphrases which have been suitably indicated.

The copyright of this thesis rests with the author. No quotation from it should be published without his prior written consent, and information derived from it should be acknowledged.

Alexander J. Malt

Abstract

In this thesis I address a concern in both existential phenomenology and embodied cognition, namely, the question of how ‘higher’ cognitive abilities such as language and judgements of truth relate to embodied experience. I suggest that although our words are grounded in experience, what makes this grounding and our higher abilities possible is grammatical structure.

The opening chapter contrasts the ‘situated’ approach of embodied cognition and existential phenomenology with Cartesian methodological solipsism. The latter produces a series of dualisms, including that of language and meaning, whereas the former dissolves such dualisms. The second chapter adapts Merleau-Ponty’s arguments against the perceptual constancy hypothesis in order to undermine the dualism of *grammar* and meaning. This raises the question of what grammar *is*, which is addressed in the third chapter. I acknowledge the force of Chomsky’s observation that language is structure dependent and briefly introduce a minimal grammatical operation which might be the ‘spark which lit the intellectual forest fire’ (Clark: 2001, 151).

Grammatical relations are argued to make possible the grounding of our symbols in chapters 4 and 5, which attempt to ground the categories of determiner and aspect in spatial deixis and embodied motor processes respectively. Chapter 6 ties the previous three together, arguing that we may understand a given lexeme as an object or as an event by subsuming it within a determiner phrase or aspectualising it respectively. I suggest that such modification of a word’s meaning is possible because determiners and aspect *schematise*, i.e. determine the temporal structure, of the lexeme. Chapter 7 uses this account to take up Heidegger’s claim that the relation between being and truth be cast in terms of temporality (2006, H349), though falls short of providing a complete account of the ‘origin of truth’. Chapter 8 concludes and notes further avenues of research.

Acknowledgements

I have flipped and flopped a number of times as regards my general outlook on the work reported here. At times I've been frustrated purple by my inability to make any substantive headway through the morass; at other times I was convinced that any idiot could do it. And in the worst of times, these two outlooks co-occurred. More recently, though, I have settled in to something approaching a very modest satisfaction.

- Terry Regier

This passage from Regier's PhD thesis – quoted by Bailey (1997) – resonated with me, and I would like at the outset to thank my parents who provided me with much needed support, both financial and, more importantly, *emotional*. Both my mother and father encouraged me when I drifted into the intersection of the two beliefs described above, and I am deeply and profoundly grateful to have such loving and supporting parents.

I wish to give a special thank you to Professor Wolfram Hinzen, my primary supervisor, who has been consistently generous with both his time and knowledge. His *Mind Design and Minimal Syntax* has inspired – and continues to inspire – much of my own work, including this thesis. I have been very fortunate to have a supervisor who is so dedicated to his students.

My secondary supervisor, Professor Matthew Ratcliffe, also deserves a massive thank you for his patience and willingness to assist a student who is often scatter-brained, and for consistently being willing to engage and constructively criticize someone who holds views quite different to his own.

I am very grateful to Mr. Josh Bergamin, Dr. Hannah Bowden, Dr. David Kirkby, Mr. Harry Lewendon-Evans, and Dr. Simon Summers who all bravely volunteered to read substantial chunks of this thesis. I have benefitted greatly from their detailed and insightful comments. Dr. James Miller also deserves a big thank you for assisting and advising me with the final details concerning formatting and submission.

I have been lucky enough to have had many conversations with a circle of fellow PhD students at Durham – the experience being made all the more beneficial given that each person was investigating language from a very different perspective to anyone else. So thank you to the members of this circle for making the past few years so informative and so enjoyable: Mr. Josh Bergamin; Mr. Tom Hughes; Dr. David Kirkby; Dr. James Miller; Dr. Ulrich Reichard; Mr. Andrew Woodard; and Ms. Pallavi Worah.

All my friends have been a source of considerable support, encouragement, and inspiration, and unfortunately I don't have space to do justice to all of them. However, I must single out a few more in addition to those mentioned above. First, the phenomenally talented Mr. James Brookes has always been a source of insight and fresh perspective, and is living proof that Chomsky is correct to say that if we want to understand language we should really just ask a poet. Second, Mr. Thomas Boardman, the mathematician who repeatedly gets me to question my own assumptions, and has helped me iron out more than one kink in my thought. And, of course, Mr. Joseph Pearce, who not only has the remarkable ability to endure my waffling and rambling on very long car journeys, but has also been instrumental in keeping my spirits up during more challenging periods of research.

Finally, thank you also to Christopher Elliott Elliott (a.k.a. Christopher White) for phoning me as I was writing this acknowledgments section and asking to be included in it. Those who have read Doug Naylor's *The Last Human* will notice from the acknowledgements section in that book that this is the second time he has accomplished this.

Table of Contents

Abstract.....	i
Acknowledgements	ii
Introduction	1
0.1 Naturalised Phenomenology	7
1. Cartesian and Heideggerian Theaters.....	9
1.1 Phenomenology.....	10
1.2 Subject and Object.....	21
1.3 Mind and Body	25
1.4 Self and Other	29
1.5 Language and Meaning.....	32
1.6 Summary.....	41
2. The Constancy Hypothesis.....	43
2.1 Behaviourism and Empiricism.....	46
2.2 Intellectualism.....	56
2.3 Judgement.....	70
2.4 Summary.....	71
3. Grammatical Structure	73
3.1 Speech and Structure.....	73
3.2 The Language Faculty: Broad and Narrow Senses	83
3.3 Descriptive and Explanatory Adequacy	85
3.4 The Paradox of Active Stupidity	91
3.5 Summary.....	92
4. Determiners, Deixis, and Embodiment.....	94
4.1 Grounding Symbols.....	94
4.2 Vocalisations, Signs, and Words	96
4.3 Primordial Spatial Concepts.....	114
5. Verbs, Aspect, and Executing Schemas.....	122
5.1 Husserl and Heidegger on Time.....	123
5.2 Verbs and Actions	128
5.3 Aktionsart	135
5.4 Aspect and 'World-Time'	137
5.5 Grammar and Action.....	146
6. The Schematism	148

6.1 Time-Determination	149
6.2 Determiner and Object.....	157
6.3 Aspect and Event.....	164
6.4 Prior to Pragmatics: Universal Grammar.....	169
7. Notes on Truth	178
7.1 Correspondence	179
7.2 Grammar.....	190
7.3 Indexing and Tense	193
7.4 Summary	197
8. Conclusions and Further Research	198
8.1 Other Categories.....	201
8.2 Writing	202
8.3 Mathematics.....	204
8.4 'Social Cognition': The Price Mechanism.....	207
8.5 Language and the Limits of Understanding	210
Bibliography.....	217

Introduction

Husserl, in a note in his diary, revealed that he considered the phenomenological analyses of perception, phantasy, time, and objects to be “the needed foundation” for a phenomenology of reason (Mohanty: 2006, 57). In this respect, Merleau-Ponty seems to have been following Husserl when he claimed that the “perceived world is the always presupposed foundation of all rationality” (1964d, 13) and when he wrote:

...critical thought encounters only *bare propositions* which it discusses, accepts or rejects. Critical thought has broken with the naïve evidence of *things*... it is not aware of our contact with the perceived world which is simply there before us, beneath the level of the verified true or false. Nor does critical thought even define the positive steps of thinking or its most valid accomplishments. (Merleau-Ponty: 1964c, 3)

Husserl’s early work was concerned with mathematics, logic and language, and during his later period moves towards the analysis of perception. Merleau-Ponty, by contrast, begins with the analysis of perception and then turns in his later works to language and truth. In both cases, the question arose of the relation between rational thought and that of pre-predicative experience.

This thesis revisits the relation between embodied experience, language, and truth in light of developments in linguistics and the cognitive sciences. Language seems to have become of increasing concern for the existential phenomenologists as their thought progressed, though it seems to be the case that this was a project which caused them great difficulties. Both Heidegger and Merleau-Ponty promised – but did not deliver – fuller treatments of language. Heidegger planned a treatment of the ‘grounding’ of the grammar of tense and aspect in division III of his *Being and Time* (see Heidegger: 2006, H349), but this failed to materialise: Heidegger never produced division III and references to it were deleted in subsequent editions of the book.

Merleau-Ponty, after *Phenomenology of Perception*, embarked on a project to be entitled *The Origin of Truth* (see Merleau-Ponty: 1964c, 8). In an unpublished prospectus of his planned work submitted whilst applying to the Collège de France, Merleau-Ponty stated that “in the experience of the perceived world [I found] a new type of relation between the mind and truth” (1964b, 6). *The Origin of Truth* was to develop the concept of ‘flesh’, where “pure ideality already streams forth along the articulations of the aesthesiological body, along the contours of the sensible things” (Merleau-Ponty: 1968, 152). But it would also account for how the *logoi* of the perceptual order “were to emigrate, not outside of every body, but into another less heavy, more transparent body, as though it were to change flesh, *abandoning the*

flesh of the body for that of language" (ibid., 153 *italics mine*). Indeed, Merleau-Ponty had recognised the need for such an account in 1946 in an address entitled 'The Primacy of Perception': "...it is necessary to establish here a difference between ideal truth and perceived truth" but he then added "I do not propose to undertake this immense task just now" (Merleau-Ponty: 1964d, 20). In the few complete chapters and working notes for what was to be *The Origin of Truth* (published as *The Visible and the Invisible*), Merleau-Ponty seems to have given no indication that he had a solution – or even that he had an approach to a solution. The task is recognised:

...there is to be sure a question as to how the 'ideas of the intelligence' are initiated over and beyond, how from the ideality of the horizon one passes to the 'pure' ideality, and in particular by what miracle a created generality, a culture, a knowledge come to add to and recapture and rectify the natural generality of my body and of the world. (Merleau-Ponty: 1968, 152)

But again it is postponed: "It is too soon now to clarify this type of surpassing" (ibid., 153). Merleau-Ponty died 19 years after embarking on this project and the posthumously published *Visible and Invisible* – containing a few chapters and a mass of working notes – makes no obvious progress concerning truth.

It might be telling that both thinkers increasingly focused on language following the publication of their major works. Perhaps in this regard the timing of Merleau-Ponty's death in 1961 was particularly unfortunate: Chomsky's *Syntactic Structures* was published in 1957, and his two subsequent major works – *Aspects of a Theory of Syntax* and *Cartesian Linguistics* – would not appear until 1965. Therefore, whilst Merleau-Ponty was able to devote considerable attention to Saussure and Piaget, it seems doubtful that he had the opportunity to study the emerging theories of generative grammar and would consequently have remained ignorant of the sophisticated theories of syntax that were being developed. However it is not my intention to argue the apparent lack of progress was caused by an inadequate appreciation of language or grammar (though I find this suggestion an interesting possibility). In this thesis I will not be engaging in interpretive work, justifying an interpretation of these thinkers, notwithstanding that in discussing their ideas I will inevitably engage in *some* interpretation.

Rather, I hope to take up the themes and address the concerns of Husserl, Heidegger, and Merleau-Ponty in light of the considerable advances in the study of language and mind which have occurred since these philosophers were writing, particularly in the study of grammar. However, given my concern with grammar, perhaps the most important influence will be from linguistics. I will suggest that both our reasoning and the move from pre-

predicative experience to rational thought have an irreducibly grammatical component, and hope that this emphasis on grammatical relations offers an interesting approach to the problems which vexed Merleau-Ponty and Heidegger.

As the title of Merleau-Ponty's incomplete project indicates, truth is of central importance to reason – in *Phenomenology of Perception* he wrote that “speech implants the idea of truth in us as the presumptive limit of its effort” (Merleau-Ponty: 2006, 221). To my knowledge, Merleau-Ponty did not develop a detailed account of the origin of truth. Heidegger, however, did engage in a discussion of truth. In both *Being and Time* and *History of the Concept of Time*, Heidegger claimed that assertion demonstrates what is true. In a similar manner to Merleau-Ponty's claim, Heidegger writes that “the assertion has its demonstration as coincidence; it is true. There is a tendency toward truth, of being true to itself, in the very sense of the assertion” (Heidegger: 1992a, 57). The assertion may demonstrate coincidence by making “certain relations stand out... of the originally given intuitive content” but Heidegger also noted there is a “*surplus of intentions*” in an assertion in that certain words (such as ‘this’, ‘is’, ‘and’) do not seem to be “perceptually demonstrable in the subject matter” in the way that words like ‘yellow’ and ‘chair’ are in the object that is a yellow chair (ibid., 57). Heidegger's question was whether any given assertion “finds its complete fulfilment in what is perceived” (ibid., 57), and, perhaps similarly, in his 1930 essay on the ‘Essence of Truth’ he would ask how it is that assertions may demonstrate truths about the world given that assertions bear no resemblance to the object and relations it makes stand out (see Heidegger: 2009). In the *History of the Concept of Time* Heidegger claimed that these surplus intentions were demonstrable in categorical intuition. In ‘Essence of Truth’ he maintained that the accordance of assertions and objects (and properties) is made possible by a more primordial relation of ‘unconcealment’. But, I am not aware of an account of either how categorical intuition makes words such as ‘the’ and ‘is’ demonstrable, or of how exactly unconcealment makes possible the coincidence of assertion and world. The majority of the chapters of this thesis are concerned with grammatical structure and categories. These chapters aim to lay some groundwork for an account of how assertions may be brought into coincidence with the world, and such an account is proposed in chapter six. Chapter seven then uses this account to offer an approach to the ‘origin of truth’.

The first chapter, ‘Cartesian and Heideggerian Theatres’, introduces themes and ideas which will be referred back to throughout this thesis. The Cartesian strategy of methodological solipsism is contrasted with the ‘situated’ approach common to existential phenomenology and the embodied cognition research program, and this contrast is illustrated via a series of

dualisms: subject and object; mind and body; self and other; meaning and language. Each dualism is linked to work on language, though the final section focuses on language. In all sections I outline how these dualisms result from methodological solipsism and elucidate how the existential phenomenologists attempt to dissolve such dualisms. Parallels are drawn between the philosophical positions and those within the cognitive sciences. Although some work is cited that suggests language constitutes, rather than expresses, meaning, the task of showing that *grammar* structures meaning is only identified and left to subsequent chapters to carry out.

Chapter two adapts Merleau-Ponty's arguments against the perceptual constancy hypothesis to suggest that the distinction between meaning and language should be dissolved. Specifically, the chapter will focus on the importance of grammatical structure. Merleau-Ponty argued that neither 'empiricism' nor 'intellectualism' provides a satisfactory account of the phenomenology of perception due to an assumption of a constant link between 'stimulus' and 'sensation', i.e. the constancy hypothesis. The chapter's first section outlines Merleau-Ponty's criticism of the empiricist (or, more accurately, the behaviourist) position then adapts it to the behaviourist view of language where a constant relation is assumed between 'stimulus' and 'verbal response'. The section also applies Merleau-Ponty's criticism to a contemporary associationist theory of language acquisition. The second section turns to Merleau-Ponty's criticism of the intellectualist's constancy hypothesis then applies this critique to Jackendoff's account of linguistic experience. Although Merleau-Ponty's critique of intellectualism concludes 'judgement' cannot capture perceptual experience, I do not wish to reject judgement as inapplicable to linguistic experience. Rather, this thesis' concern is, in part, with the origin of judgements and so I postulate that judgement is a grammatical phenomenon. Later chapters attempt to provide an account of how judgements and assertions are possible, but in the final (brief) section of this chapter I suggest that this might be a 'mangrove effect': although it might be natural to assume that thought consists of judgements and that these judgements are expressed by language, it might be the case that linguistic structure makes possible judgement and thereby structures thought.

Chapter three, 'grammatical structure', turns to a central insight of the Cartesian tradition: the structure-dependence of linguistic expressions. 'Inner symbol flight', a strategy within the embodied cognition tradition, encounters difficulties with language precisely because linguistic expressions are structures specifying the relations of symbols to other symbols. One approach to capturing these relations whilst avoiding traditional symbols has been to use connectionist networks and to conceive of language as a dynamical system with

words as regions of state space and grammatical rules reconceived as permissible moves from one region to another. Proponents of this account attempt to model linguistic structure without strict grammatical rules, instead using devices such as oscillators which might spontaneously develop in a network in response to inputs. Due to their resemblance to ‘finite-state grammars’, such approaches have been subjected to Chomsky’s criticisms of these devices. Connectionist networks have also been criticised in that although they might produce correctly *ordered* strings of symbols, they remain in principle incapable of modelling grammatical *structure* – that is, they are *weakly*, as opposed to *strongly*, generative. I suggest that although connectionists can arguably avoid the former set of criticisms, they still seem very much susceptible to those concerning structure-dependence. Following this, the chapter introduces several other topics employed to develop a descriptively adequate account of linguistic structure, namely ‘discrete infinity’, ‘nativism’, and relation of the ‘language faculty’ to other parts of the mind. The relation of language to other parts of the mind is of central importance for the most recent incarnation of generative linguistics, the ‘minimalist program’, and next section of the chapter therefore describes the emergence of the minimalist program from the project of reconciling descriptive adequacy (an accurate account of linguistic structure) with explanatory adequacy (an accurate account of language acquisition). The chapter ends with a discussion of the ‘paradox of active stupidity’, which concerns how a ‘stupid’ brain could produce the linguistic cognitive technologies proposed by those in the embodied cognition research program. I examine Clark’s proposal that there occurred a small alteration which made possible repeated bootstrapping operations whereby increasing sophisticated technology is developed. My conjecture is that the ‘spark that lit the intellectual forest fire’ (Clark: 2001, 151) is grammatical structure, noting the link to theories of language evolution postulating a ‘jump’ in evolution (rather than gradualism).

Chapters 4 and 5 concern the grounding of two grammatical categories: chapter 4 argues that determiners are grounded in embodied, spatial deixis; chapter 5 argues, following Narayanan (1997 and 1997b) that aspect is grounded in the structure of our bodily motor processes. In both chapters, I suggest that the structural relations created by grammar make the grounding of these categories possible. Chapter 4 in particular contrasts the abilities of our species with those of the other animals, particularly the great apes, to demonstrate a *qualitative* difference between language and animal communication systems. This difference, I suggest, may therefore be attributed to the grammatical organisation of human thought – although we cannot definitively say that *all* animals lack structure-dependent operations in their communication systems, “no definite example has yet been shown” (Aitchinson: 2011,

24). To this end, Chapter 4 opens with a section introducing Merleau-Ponty's early gestural theory of language and his subsequent rejection of it. The following section proceeds to the contrast with animal communication systems, noting that apes in particular display some impressive communicative abilities and 'practical reasoning' abilities. Nevertheless, apes seem to be unable to solve certain problems which are dealt with easily by human infants. The chapter's final section is a discussion of our primordial concepts of space, drawing heavily on Heidegger. Although chapter 5 concerns aspect, it begins with an overview of Husserl and Heidegger's work on time, moves to the grounding of verbs in 'motor-schemas', then turns to aspect's grounding in the general structure of these motor schemas.

Chapters 4 and 5 provide the groundwork for chapter 6, 'the Schematism', where I take up the Kantian notion of 'time determination'. I suggest that assertions are brought into coincidence with the world because, via the categories of determiner and aspect, we can translate a 'lexeme', or word root, into a temporal pattern that is homogenous with that part of the world we wish to indicate. When a lexeme is embedded within a determiner phrase it is schematised as an object, and when it is aspectualised it is schematised as an event. The final section of this chapter draws on Husserl's theory of 'universal grammar' to argue that 'grammatical time determination', or schematisation of a lexeme, preserves a kernel of meaning but allows this meaning to assume the temporal form of an event or object. This would imply that grammar is 'prior to pragmatics' in that grammar delineates forms of meaning which may find 'fulfilment' in experience.

The 'schematism' forms the basis for the seventh chapter, 'Notes on Truth'. In these notes I suggest an approach to the question of the 'origin of truth' though, as the chapter's title indicates, this is far from a full account. The chapter opens with a discussion of the relation of 'correspondence', which has been held by a range of thinkers – including Heidegger – to be what is in need of explanation, not the explanation itself. Heidegger and, from the embodied cognition research program, Lakoff and Johnson argue on the basis of our concepts' grounding in our embodied being-in-the-world that there is a degree of relativity to our judgements of truth (though neither accept full relativism). Whilst being sympathetic to this view, I also draw on the generative tradition – particularly Hinzen and Sheehan (forthcoming) – to indicate that grammatical structure plays a critical role in determining what expressions are evaluable for truth: only the highest clause (the 'matrix clause') is evaluated for truth by the speaker or hearer; embedded clauses are not open to such evaluation. Finally, I turn to the category of tense. Although determiner and aspect allow expressions to be in coincidence with the world via time-determination, tense is required so that the expression may be

indexed to a point in time. Further, I suggest that an analysis of tense allows a sophisticated taxonomy of such indexing.

Chapter 8 concludes and gives several avenues for further research.

0.1 Naturalised Phenomenology

During the first half of the twentieth century, phenomenologists appeared to be hostile to ‘naturalism’, that is, hostile to the doctrine which made the metaphysical claim that all things are of one substance and the methodological claim that all things should be investigated in the same way (see Zahavi: 2010). However, this does not entail that the phenomenologists were hostile to science as such. As Husserl put it:

When it is actually natural science that speaks, we listen gladly and as its disciples. But it is not always natural science that speaks when natural scientists are speaking; and it assuredly is not when they are talking about ‘philosophy of nature’ and ‘epistemology as a natural science’. (Husserl: 1983, §20)

Arguably, then, phenomenology has always been attendant to scientific investigation and always open to interaction and dialogue with other disciplines. Husserl, Heidegger and Merleau-Ponty – to varying degrees – all adopted what could be described as this milder form of naturalism: Husserl, in *Cartesian Meditations*, wrote “it would of course be pointless to treat the positive science of *intentional psychology* and *transcendental phenomenology* separately” (1999, §61; see also §57); Heidegger became friends with the Swiss psychiatrist Medard Boss, who wrote that Heidegger “saw the possibility that his philosophical insights would not be confined merely to the philosopher’s quarters but also might benefit many more people, especially people in need of help” (see Heidegger: 2001, xvii); Merleau-Ponty thoroughly embraced scientific work, engaging with the research of Goldstein (neurology), Piaget (psychology), de Saussure (linguistics), amongst others.

Leaving aside inter-disciplinary dialogue, there is an important methodological point to be highlighted. Merleau-Ponty’s distinctive method uses accounts of *abnormal* perception/cognition to better elucidate the qualities of normal experience. There is at least one passage where Husserl employs a similar method, discussing the effects on perception of taking *santonin* (Husserl: 1989, §18b). Heidegger’s *Zollikon Seminars* also adopt – in places – a strategy similar to that of Merleau-Ponty. Topics of discussion include the medical profession, schizophrenia, and hallucination. More recently, Gallagher has employed such methods, but also notes that, due to the array of disciplines which he draws upon, “it is an extremely risky strategy, for I cannot claim proficiency in more than one of these fields, and certainly no one individual can be expert in all these areas” (2006, 3). Further, Gallagher identifies the

terminological problems of an interdisciplinary approach: “Terminologies and conceptual frameworks vary across research fields” (ibid.).

Since I will also be integrating studies from a variety of disciplines, this thesis could perhaps be described – in this loose sense – as a work of ‘naturalised phenomenology’. Because of this, I wish to briefly repeat Gallagher's warnings. First, whilst I have done my best to accurately represent the results, theories, and research programs of disciplines outside philosophy, I cannot be an expert in all these fields. Second, there is risk of terminological confusion. I have attempted to clearly define each new item of technical vocabulary as it is introduced. Where there are clashes between a word's technical and ‘ordinary language’ uses I have attempted to reserve the term for its technical sense, specifying exactly what this technical sense is as the term is introduced. For example, when I use the term ‘aspect’ I use it in the technical sense it possesses in linguistics – that is denoting an event's internal temporal structure – and have endeavoured to avoid standard usage. The same word might vary in its technical uses across disciplines. In such cases I will specify and attempt to keep to a single meaning. In cases where the same word must be used in two senses I will make clear which sense is being used in each instance.

1. Cartesian and Heideggerian Theaters

The ‘Cartesian Theatre’ was a term introduced by Dennett to denote the traditional model of consciousness where it is assumed that “somewhere, conveniently hidden in the obscure ‘centre’ of the mind/brain, there is a Cartesian Theatre, a place where ‘it all comes together’ and consciousness happens” (Dennett: 1993, 39). The view of the mind as internal to our bodies, whose interactions with the world are mediated via representations generated by the senses, and whose operations consist of manipulations of representations and symbols, is a perspective I will refer to as ‘Cartesian’. The phrase ‘Heideggerian Theatre’ was used by Clark as a play on Dennett’s term, and denotes a model where the *body* is “the place where it all comes together, or as together as it comes at all” (Clark: 2011, 217). According to this alternative perspective the mind is non-trivially embodied and is embedded, or situated, within an environment: “Minds make motions, and they must make them fast – before the predator catches you, or before your prey gets away from you. Minds are not disembodied logical reasoning devices” (Clark: 1997a, 1). Thus the mind cannot be investigated apart from body and world because these, in part, *constitute* the mind.

Cartesian approaches rest on what Cooper has referred to as the ‘spectatorial premise’, that “that knowledge and understanding belong, in the final reckoning, to *spectators* rather than *agents*” (Cooper: 2004, 48). In contrast to the Cartesian view of an internal observer making decisions based on their observations is the view that *action* that is primary; that we are, first and foremost, embodied beings continuously influencing and being influenced by our surrounding environment. The latter position is one that has been adopted by existential phenomenology and the embodied cognition research program, whereas Cartesianism appears to have been presupposed by cognitive psychology. This chapter contrasts these two approaches.

The first section gives an overview of Husserl’s phenomenology and uses this to both introduce methodological solipsism and contrast this approach with that of existential phenomenology. I will also draw comparisons with other philosophers (namely, Descartes) and emphasise parallels with research with the cognitive sciences. The purpose of this first section is to introduce concepts which will be referred back to throughout the rest of this thesis. Since reason was considered by Husserl and Merleau-Ponty to be ‘founded’ in the analyses of more basic, ‘pre-predicative’ experience, an initial, brief engagement with topics such as perception, embodiment, and inter-subjectivity is warranted, as the concepts introduced here will recur throughout this thesis.

Subsequent sections illustrate how the Cartesian, spectatorial premise leads a series of dualisms: subject and object; mind and body; self and other; meaning and language. During

a brief discussion of each of these dualisms I will explain how existential phenomenologists have attempted to dissolve each of these dualisms, and draw parallels between the philosophical treatments of these dualisms and work in cognitive science. Where relevant the work mentioned from the embodied cognition tradition will be linked to the topic of language.

Although this chapter contains discussion of Descartes, Husserl, Heidegger, and Merleau-Ponty, I should emphasise that I am not a scholar of these thinkers and, given the complexity of their work, it is quite possible that my interpretations are not completely accurate (despite my best efforts). Husserl, in particular, is exceptionally difficult, and this difficulty is compounded here by my presenting existential phenomenology in contrast with his ‘Cartesian’ method because Husserl himself believed he had been significantly misinterpreted. However, given that my aim is primarily to present themes in existential phenomenology and related work in embodied cognition, I hope I might follow similar reasoning to that of Cooper in his *Existentialism*:

I do not need to become embroiled in most of the controversies over Husserl’s meaning. This is because I am concerned with existentialists’ responses to Husserl as *they* understood him. Even if, as he himself believed, they got him wrong in certain respects, this does not detract from the philosophical value of examining the confrontation as they perceived it. (Cooper: 2004, 39)

The purpose of this chapter is *not* to elucidate and interpret specific philosophers but rather to use their work to present general themes and concerns present in their work, especially differences between Cartesian and Heideggerian approaches to mind and language.

1.1 Phenomenology

Phenomenology originated in the work of Husserl, who considered it the discipline “fundamental to philosophy” (Husserl: 1983, XVII). Importantly, it is an *eidetic* discipline (Mohanty: 2006, 56): Phenomenologists seek to discern the *essential* structures of conscious experience by examining first-person descriptions of specific experiences – it is a science of the essence of consciousness (Husserl: 1983, §34).¹ Following Brentano, Husserl noted that intentionality appears to be “the fundamental characteristic of ‘psychic phenomena’” (Husserl: 1999, 41): Each act of consciousness intends, or is directed towards, an object. I cannot watch, but be watching nothing. I cannot love, but love no one. Rather: I am watching *the television*; I love *my wife*. So important is intentionality to Husserl that he writes: “Intentionality is the name of the problem encompassed by the whole of phenomenology”

¹ Another characterisation of phenomenology – given by Smith and Woodruff Smith – comes from the observation that the stream of consciousness can be parsed in a variety of different ways. On this characterisation, phenomenology is “the science of such parsings” (2006, 21).

(Husserl: 1983, §146). Since non-intentional forms of consciousness are inconceivable, intentionality is the 'essence' of consciousness (Husserl: 2001b, V §95). Consciousness intends different objects and does so through "highly diversified" modes, e.g. loving, watching, judging, etc. (Husserl: 1983, §96). A mode is the meaningful medium of a given intentional (conscious) act, and Husserl introduces his technical concepts of 'hyle', 'noesis' and 'noema' to elucidate the structure of these modes.

Hyle, or 'hyletic data' (ibid., §85), is the sensuous 'stuff-data' of conscious acts – colour, texture, etc. – and serves as a "non-intentional base" (Kusch: 1989, 104) for each "concretely complete intensive mental process" (Husserl: 1983, §96). Husserl calls such mental processes 'noetic moments', or 'noeses' (ibid. §85), and to each noesis is correlated a noema. Noemata are generalizations of the notion of meaning (Føllesdal: 1982, 74). Noeses are (temporally extended) mental acts, whereas noemata are abstract entities (i.e. they do not occur in time). Noemata are composed of 'thetic content' and 'sense'. 'Thetic content' is how conscious posits its object, and 'sense' is how the object is presented.²

To clarify, in the description 'I am sure that Napoleon was the vanquished at Waterloo' the intentional object – Napoleon – is being considered 'the vanquished at Waterloo'. Therefore the noema is 'being sure that Napoleon is the vanquished at Waterloo', where the thetic content is 'being sure' and the sense is 'Napoleon was the vanquished at Waterloo'. To this noema is correlated a noesis – the complete mental process itself. Additionally, in this act there is no hyletic data ('Napoleon'), for Napoleon is long dead. In this act Napoleon is pure noesis.

Intentional objects can be experienced through different noemata: we might be sure that Napoleon was the victor at Jena (a different sense); we might not 'be sure', but could also 'be exclaiming that', 'questioning whether', 'loving the fact that', etc. (differing thetic contents). Hence, noemata may differ in sense, thetic content or both even if their intentional objects are identical: "...there can be something identical in the parallel mental processes which are different in sort" (Husserl: 1983, §91). Husserl therefore stated that "a number of noeses are built up on one another in the unity of a concrete mental process" (ibid. §93) and dubs this feature of conscious experience 'synthesis'. The same object is experienced in various ways but there is no question that it is the same object: "We say that the intentional Object is continuously intended to in the continuous or synthetical course of consciousness but again and again 'presents' itself 'differently'; it is 'the same'; it is only given in other

² Although I have here given Føllesdal's interpretation of Husserl's theory of the noema, there exist numerous interpretations and reconstructions, resulting in different models of intentionality (for an overview, see Smith and Woodruff Smith: 2006, §VII).

predicates with a different determination-content..." (ibid. §131). Consciousness 'constitutes' its objects through continual syntheses of noeses, and the discipline of transcendental phenomenology therefore reveals the essential rules which correlate a given object with its multitude of appearances.

As Husserl's phenomenology developed, he came to see his initial approach as 'static', or synchronic – that is, his work did not treat conscious acts as temporally extended but instead as instantaneous 'snapshots' in time. He became progressively more concerned with 'diachronic' analysis – analysis of conscious experience as it occurs through time. This development is important for two reasons. First, the temporal structure of consciousness was a topic which Husserl returned to repeatedly throughout his life as he regarded time as "the first and basic form" of consciousness (Farber: 1966, 84; Husserl's account of 'time consciousness' will be discussed in chapter 5, below). Second, diachronic analysis proves necessary for adequate phenomenological descriptions of 'pre-predicative' experience, and, by extension, is a necessary component of the foundation of an adequate phenomenology of reason. To illustrate this, consider the example of visual perception.

Visual perception has an *adumbrative* character. We do not perceive the entirety of an object at once but instead have a 'full awareness' of the object's visible side, and a non-sensory awareness of the object's non-visible sides. An 'adumbration' is "a sensation that is interpreted as being as of some constant feature, or a complex of sensations that is interpreted as being of some constant thing" (Mulligan: 2006, §6.1). Each adumbration is therefore a moment of full awareness of an object, or an 'authentic' presentation. The accompanying non-sensory awareness of the rest of the object, lacking sensory 'fulfilment', is termed 'inauthentic'. As we move around the object (or as the object moves around us) we are given different presentations – different adumbrations – of the object. An adequate characterisation of perception cannot restrict itself to description series of static, sensory presentations as, from the perspective of raw sensory 'inputs', two perceptions of two qualitatively identical sides of one object and two perceptions of two sides of two different objects would appear as four of a kind (ibid., §7.1). Hence, the dynamic nature of visual perception is integral to it: "The continuous transition from one appearance to the next of the same object is not itself any sort of judgement of identity. Rather, such transitions are the *basis of perceptual judgements of identity*" (ibid., *italics mine*).³

This example serves to illustrate why Husserl believed analyses of dynamic, pre-predicative, perceptual experience to be foundational for an analysis of reason. Judgements

³ Mulligan (2006) gives an account of the similarities between Husserl's account of perception and the ecological theories (see below for a brief discussion of the latter).

require a basis in pre-predicative experience, and noematic meanings may be traced back to their origin in such experience – this is the task of genetic phenomenology. Importantly, genetic phenomenology should not be understood as a distinct type of phenomenology. Genetic analysis must be carried out in terms of the invariant meaning-structures uncovered via static phenomenology. Equally, static phenomenology's meaning-structures are grounded in phenomena that are inseparable from their generation (Hopkins: 2011, 5). The word 'genetic' is therefore not intended to convey an "empirical, factual, or historical sense" but rather "the sense of the intentional reference of all ideas or principles to their 'original' evidences" in direct experience (Farber: 1966, 28; see also Hintikka: 2006, 83). To use the example of perception, the concepts of 'authentic' and 'inauthentic' presentations (see above) can themselves be traced back to dynamic perception, specifically "in every transition from what was an empty awareness of the far side of an object to a 'full' perception thereof" (Mulligan: 2006, §7.1).

During Husserl's final years he introduced an explicit historical dimension to genetic phenomenology: Whilst meanings originate in pre-predicative experience, many meanings are 'sedimentations', initially generated many years (even millennia) prior to our birth and given to us culturally. Husserl's final works therefore consider the problem of constitution in relation to both culture and history. Genetic analyses now takes into account an ideal object's historical development within culture, with the essential parts of that meaning potentially being identified as generated at a precise historical point (see Hopkins: 2011, 5).

The development of Husserl's phenomenology, the concern with clarifying the role of the ideal in cognition, and the manner in which this clarification was to be carried out is evident in the works published during his lifetime: his early *Logical Investigations* argued for a 'Platonist' ontology of ideal objects and opposed doctrines reducing the ideal to the 'real' (e.g. psychologism); his *Ideas* explicitly introduced the concern with the constitution of objects, noesis-noema correlations, and synthesis; his later works traced the origin of ideal objects to pre-predicative experience (*Formal and Transcendental Logic*) and their genesis in history (*Crisis*).⁴ In *Ideas* Husserl seemed to conceive of the phenomenology of reason in terms of the structures identified in static analysis: "the consciousness-subject itself, *judges* about actuality, asks about it, deems it likely, doubts it, resolves the doubt and thereby effects the 'legitimations of reason'" and a phenomenology of reason would make clear "the essence of this legitimacy" (Husserl: 1983, §135). But the aim of genetic phenomenology also seems to be anticipated in his 'principle of all principles' outlined in *Ideas*:

⁴ Needless to say, Husserl's lectures and the works published after his death give a far more complete picture of his philosophical development (see Mohanty: 2006 for an overview).

...every originary presentive intuition is a legitimising source of cognition, that everything originarily (so to speak, in its 'personal' actuality) offered to us in 'intuition' is to be accepted simply as what it is presented as being, but also only within the limits in which it is presented there. We see indeed that each theory can only again draw its truth itself from the originary data. (Husserl: 1983, §24)

Explicit in the quotation above is that genetic phenomenology, like Kantian philosophy, is *critical* – Husserl's aims to elucidate how objective knowledge and acts of judgement are possible and justified (how intuitions are 'legitimising functions of cognition'). Hence, he characterised his phenomenology as 'transcendental' (see Moran: 2008, 183). This critical enterprise traces the genesis of our concepts to experience and investigates whether these concepts are *faithful* to what is given in experience – the point is to "set aside all prejudices" and compare our concepts, words, and opinions with the "*things themselves*, to consult them in their *self-givenness* and to set aside all prejudices alien to them" (Husserl: 1983, §19 *italics mine*). Hence, Husserl considered analysis of pre-predicative experience foundational for the phenomenology of reason.

At this point, however, an obvious question arises: if Husserl's project is to trace and compare our concepts to the things themselves, what are 'things themselves'? Husserl obviously does not use the phrase in a Kantian sense – that is, to denote objects how they are independently of our perception or cognition of them – because Kantian things-in-themselves by definition cannot be objects of cognition or perception. In fact, it is crucial to note that Husserl *cannot* accept the Kantian definition of things-in-themselves because to do so would be to violate his 'principle of principles' (see above): Kantian things in themselves cannot be intuited, *ergo* they have no legitimate basis in his theory (see Philipse: 2006, §XII). Equally, Husserl cannot identify concretely the things themselves in outer perception due to its adumbrative nature (we never perceive the object all at once). However, an ordered series of adumbrations will provide greater completeness, adequacy, and richness – such a series indicates an *ideal* 'limit' of all possible adumbrations in which the object would be adequately given. Husserl redefines the 'thing-in-itself' as the "objective intentional correlate of such an adequate perception" (quoted in *ibid.*, §XIII). Consequently, the ideal thing-in-itself is an *immanent* object.

The distinction between 'immanence' and 'transcendence' may also be derived from the adumbrative character of perception (Carmen: 1999, 209). Immanent phenomena are those which are *not* given in outer perception, and therefore do not have different presentations according to perceptual variables. Husserl defines mental acts directed to immanent phenomena as "those to which it is *essential that their intentional objects... belong*

to the same stream of mental processes to which they themselves belong” (Husserl: 1983, §38). In other words, an immanent object is necessarily a unity with the person intending it. By contrast, this is not true in the case of transcendent objects: “Such, for example, are all acts directed to... intensive mental processes belonging to other Egos with other streams of mental processes, and likewise all acts directed to physical things or to realities of whatever sort” (Husserl: 1983, §38). When Husserl calls for a return to the things themselves, he appears to mean *immanent* objects. The question therefore becomes: How do we intuit immanent objects?

Much of Husserl’s methodology concerned itself with precisely this question. Whereas Kant appeared to inspire the critical spirit of Husserl’s work, it was Descartes who inspired the development of Husserl’s technique of phenomenological ‘reduction’, or ‘epoché’. In his *Cartesian Meditations* Husserl would claim his phenomenology could be characterised as “a neo-Cartesianism” (Husserl: 1999, §1) and it was his neo-Cartesian method which *enabled* phenomenology to be a transcendental enterprise:

Descartes... gave transcendental phenomenology new impulses through his *Meditations*; their study acted quite directly on the transformation of an already developing phenomenology into a new kind of transcendental philosophy. (ibid., §1)

Cartesian Meditations was therefore an explicit reference to Descartes’ *Meditations on First Philosophy* where reasons were “set forth... for which we may, generally speaking doubt about all things and especially about material things” (Descartes: 1997a, 130).⁵ This methodological doubt was employed to identify such things of which we are absolutely certain (i.e. those things beyond all doubt) and thus establish a “firm and permanent structure” (ibid. 134) for the new mechanistic sciences. Employing this method, Descartes made the following observations: our senses can be “deceptive” in cases such as optical illusion, and therefore we cannot rely on our perception if we seek truth (ibid. 135); that, through insanity, hallucination or dream, we might believe we were in one place, whereas, in reality, we were elsewhere – “that I was dressed and seated near the fire, whilst in reality I was lying undressed in bed!” (ibid.); that, via the malign influence of some “evil genius not less powerful than deceitful” we could be subject to an elaborate deception – “that the heavens,

⁵ Throughout this introduction I will only briefly discuss Descartes’ own positions, but I shall try to do so without overly-simplifying his work or misrepresenting it. As Cottingham notes: Cartesianism “is often used as a label for a variety of doctrines that are so preposterously silly that it can scarcely be a subject of warm self-congratulation for modern philosophers to have succeeded in demolishing them” (Cottingham: 2008, 76).

the earth, colours, figures, sound, and all other external things are nought but the illusions and dreams of which this genius has availed himself" (ibid. 138).

According to Descartes, such doubt unveils the truth that "I am, I exist, is necessarily true each and every time that pronounce it, or that I mentally conceive it" (ibid. 140). That is, I cannot possibly be wrong in thinking 'I exist' as this very act of thought proves its validity: "I think, therefore I am" (Descartes: 1997b, 279). Furthermore, 'pure' mental acts are also indubitable – for in the act of thinking 'two plus three equals five' or 'I am feeling happy' we cannot doubt the truth of these propositions (Descartes: 1997a, 196). Such mental acts are 'clear and distinct'. By contrast, we have no right to make the inference "I walk, therefore I am" for this refers to a motion of the body – though we could say "I am aware of walking, therefore I am" which is purely mental, and hence indubitable (ibid. 197).

Methodological doubt highlights our status as thinking beings: "What is a thing which thinks? It is a thing which doubts, understands, conceives, affirms, denies, wills, refuses, which also imagines and feels" (ibid. 143). Whereas, according to Descartes, material objects can be explained *mechanistically* (i.e. via Galilean science), the mental simply does not seem to be amenable to this sort of explanation. Consequently, Descartes postulated two logically independent substances: 'res cogitans' – mental substance – where thought is the essential quality; 'res extensa' – physical substance – the essence of which is extension in space.⁶ Whilst Husserl did not employ methodological *doubt*, he nonetheless considered Descartes' method of 'doubt' to have performed the invaluable service of identifying the domain of pure subjectivity – "the ego as subject of his pure *cogitationes*" (Husserl: 1999, 3).

Husserl's 'Cartesian' method of 'phenomenological reduction' – or 'epoché' – requires 'bracketing', or 'parenthesising', the *objects of our experience* in order to focus on the *experience of those objects*. 'Bracketing' is analogous to putting a sentence in quotation marks: If I write 'Workers of the world, unite!' then I, unlike Marx, am not encouraging the workers of the world to unite. Via quotation marks, I neither advocate nor denounce the meaning, but instead draw attention *to the sentence itself*. Equally, the epoché involves setting aside all presuppositions we have about the objects of our consciousness – whether these presuppositions are derived from scientific theory, mythology or just our everyday

⁶ "...extension in length, breadth and depth, constitutes the nature of corporeal substance; and thought constitutes the nature of thinking substance. For all else that may be attributed to body presupposes extension, and is but a mode of this extended thing; as everything that we find in mind is but so many diverse forms of thinking" (Descartes: 1997b, 297). This does *not* mean Descartes believed mind necessarily lacks spatial extension; the conception of mind as spatially extended is in fact present within Descartes' philosophy (see below, and see Lokhorst: 2011).

beliefs and opinions. Importantly, this is not *doubt* – we do not (as Descartes did) negate our beliefs, but simply make no use of them:

...we parenthesise everything which that positing encompasses with respect to being: *thus the whole natural world* which is continually ‘there for us’, ‘on hand’, and which will always remain there according to consciousness as an ‘actuality’ even if we choose to parenthesise it. (Husserl: 1983, §32)

Methodologically, the epoché radically shifts our perspective: We move from the ‘natural attitude’ of everyday beliefs, mythology, and scientific theory, to the ‘transcendental perspective’: “I stand *above* the world, which has now become for me, in a quite peculiar sense, a *phenomenon*” (Husserl: 1975, §41). From this transcendental perspective, consciousness no longer focuses on the objects of the world, but instead intends *the structures of conscious experience themselves*. Husserl, analogously to Descartes, thereby isolates an immanent domain of pure consciousness, and phenomenology is the discipline which describes the ideal meanings that are the elements of this immanent domain: “Every object in the world, whether natural or social, and every item of knowledge, is now viewed only as a correlate of a particular experience of an individual, reflecting person” (Farber: 1966, 67), that is, the real and ideal entities excluded by the epoché are “represented in the phenomenological sphere by the total multiplicities of senses and posita corresponding to them” (Husserl: 1983, §135). Only from the transcendental perspective (contends Husserl) can we intend the structures of conscious acts: intentionality; noesis-noema correlations; the structure of noemata; synthesis; constitution; things-in-themselves.⁷

The epoché may therefore be considered “a mere prolegomenon to a study of the interrelations of the different ingredients of the world of our concepts, culminating in a search for the ultimate foundation of this conceptual world in our direct experience” (Hintikka: 2006, 82). Arguably, the development of Husserl’s phenomenology was motivated by his desire to gain logical insight into why mathematical and scientific techniques actually worked and produced knowledge – this was the concern driving his first book, *Philosophy of Arithmetic*, of which he would later remark that it was an early exercise in constitutive phenomenology (see Moran: 2008). Such insight, he believed, could only come from phenomenology due to its focus on the essences of the mental acts and their interconnections with mathematical methods (see Willard: 2006, 143). Unsurprisingly then, Husserl maintained transcendental

⁷ That Husserl believes the epoché allow the intuiting of things-in-themselves appears justified by his assertion that “each actual physical thing belonging to Nature is thus represented by all the senses and changing fulfilled posita in which it is the correlate of possible intensive mental processes... it is therefore represented by the multiplicities of ‘full cores’ or, which signifies the same thing here, by *all possible ‘subjective modes of appearance’* in which it can be noematically constituted as identical” (Husserl: 1983, §135, *italics mine*).

phenomenology can only be understood “in terms of the transcendental phenomenological reduction [the epoché]” (Husserl: 1999, 32): His Kantian objective – understanding the conditions for the possibility of (mathematical) knowledge – is approached with Cartesian means.

Contemporary cognitive psychology also maintains a Cartesian approach. Cognitive psychologists adopt “methodological solipsism as a part of... [their] research strategy” (Fodor: 1991, 655).⁸ Essentially, mental operations are viewed by cognitivists as formal, computational operations on mental symbols (‘representations’) instantiated ‘in’ neural ‘hardware’. The question of whether our mental symbols are faithful depictions of what is actually in our environment is suspended in order to focus research on the mental operations themselves.⁹ As Chomsky puts it:

...in the study of determination of structure from motion, it is immaterial whether the external event is successive arrays of flashes on a tachistoscope that yield the visual experience of a cube rotating in space, or an actual rotating cube, or stimulation of the retina, or optic nerve or visual cortex. (Chomsky: 2005b, 23)

When it comes to consciousness, cognitivists might aim to identify the ‘correlates’ of specific experiential qualities. Jackendoff, for example, speaks of the “*functional correlates of consciousness* [FCCs], however they may be realised in the brain” (Jackendoff: 2007, 80). And, ‘below’ the functional-computational mental level, Crick speaks of the ‘neural correlates of consciousness’ (NCCs) generated by the brain in response to data fed to it by the sensory organs. It is unclear that there is any ‘one-to-one’ mapping between each of the correlated levels. If the firing of neurons in a given NCC correlates with a particular FCC (both correlated with a particular experiential quality/state) then could the FCC be instantiated on a different system? Could there be different NCCs for the same conscious state? Answering these questions is not the purpose of this thesis, but I raise them to make emphasise what appears to be the contingent relation between the noetic, functional, and neural levels.

It is such Cartesianism which the existential phenomenologists – Heidegger, Sartre, and Merleau-Ponty – objected to. According to the existential phenomenologists, this method inevitably results in insurmountable obstacles which (following Russell: 2001) might be called ‘the problems of philosophy’. These are usefully formulated as a series of dualisms by Cooper

⁸ According to Smith and Woodruff Smith (2006, 10), Fodor's use of 'methodological solipsism' follows Carnap, who had explicitly equated it with Husserl's method of epoché.

⁹ Fodor gives an important qualification: “Methodological solipsism isn't, of course, solipsism *tout court*” (1991, 668).

(2004): mind and body; subject and object; self and other.¹⁰ In each case, the Cartesian distinction between *res cogitans* and *res extensa* produces a conceptual division that has framed much subsequent debate and research, as well as giving rise to a host of philosophical problems. As Wittgenstein put it: “A picture holds us captive” (Wittgenstein: 2005, §115).

Like Husserl, the existential phenomenologists placed great emphasis on description. However, they felt Husserl’s Cartesianism prevented him from realising the full implications of his own ideas:

Husserl [according to the existential phenomenologist] betrays his own doctrine of intentionality. The doctrine’s true message, that no sense can be made of consciousness except in terms of its engagement with the world, is contradicted by the phenomenological reduction which reduces experience to the ‘immanent’ contents of consciousness. (Cooper: 2004, 48)

Whilst Husserl did claim that transcendental phenomenology, precisely because of its radicalisation of Cartesian principles, “is obliged... to reject nearly all the well-known doctrinal content of the Cartesian philosophy” (Husserl: 1999, §1), the existential phenomenologists felt that his method simply reinstated traditional philosophical prejudices and that phenomenology itself – faithful description of phenomena – would reveal the impossibility of properly implementing the epoché. Their judgement of Husserl could perhaps be summarised as ‘so near yet so far’ (Cooper: 2004, 46). Existential phenomenology’s descriptions do not, it should be emphasised, aim at providing a theory to unite the dualisms formulated above. Neither do they argue for a monism (i.e. reducing or excluding one half of each dualism). Rather, description should illustrate that the problems of philosophy arise from a confused perspective and that once confusion is replaced with clarity the problems simply cannot be coherently formulated. The strategy, then, is not to solve but to *dissolve* these problems: “True philosophy” writes Merleau-Ponty, “consists in *relearning* to look at the world” (2006, xxiii *italics mine*).

Such a strategy is not exclusive to the phenomenologists – it was also adopted by Wittgenstein (amongst others), who claimed philosophers should “do away with all explanation, and description alone must take its place. And this description gets its light, that is to say its purpose, from the philosophical problems” (Wittgenstein: 2001, §109). When description produces clarity, “philosophical problems should completely disappear” (ibid. §133). However, dissolving philosophical problems is no simple task:

¹⁰ Cooper also includes two other dualisms: fact and value, and reason and passion. I will focus on the three listed because they are most relevant for this thesis.

Why is philosophy so complicated? It ought, after all, to be completely simple. – Philosophy unties knots in our thinking, which we have tangled up in an absurd way; but to do that, it must make movements which are just as complicated as the knots. Although the *results* of philosophy are simple, its methods for arriving there cannot be so. (Wittgenstein: 1975, §2)

Wittgenstein therefore concludes: “The complexity of philosophy is not in its matter, but in our tangled understanding” (ibid., §2). If philosophy’s goal is to untangle knots in our understanding then it is ‘therapeutic’. How such descriptive ‘therapy’ will dissolve these dualisms will (I hope) become apparent in the context of the discussions below. However, the descriptions will reveal three points which should be identified now. First, an adequate understanding of ourselves cannot ‘bracket’ the surrounding world – fundamentally, we are not transcendental egos but ‘being-in-the-world’. Second, the embodiment is not a trivial or contingent fact about consciousness – rather, consciousness *is* embodied. Third, knowledge of others is not mediate and inferential, but direct and perceptual. Cartesian methods, by insulating a domain of pure subjectivity, inevitably overlooks these points – as Merleau-Ponty would put it, the “most important lesson which the reduction teaches us is the impossibility of a complete reduction” (2006, xv).

The existential phenomenologists’ emphasis on ‘being-in-the-world’ has a counterpart in ‘extended’, ‘embodied’, or ‘ecological’ approaches to cognitive science which reject methodological solipsism and instead emphasise the embeddedness of the organism in its environment.¹¹ The reasons for this – explored in more detail below – are twofold (see Rowlands: 1995): first, understanding *what* computational task faces the organism is impossible without the understanding what information is available to the organism from its environment; second, organisms can manipulate and transform the environment, effecting information processing, *via action*. The ‘extended mind hypothesis’ takes advantage of this second point and speculates that “the biological brain has in fact evolved and matured in ways which factor in the reliable presence of a manipulable external environment” (Clark and Chalmers: 1998, 11). From this perspective, the structure and presence of the environment plays an *active* role in cognitive processes rather than being a passive source of data. The embodied cognition program therefore offers an approach issues in cognitive science, including language, which differ markedly from those of the Cartesian perspective (explored briefly below).

¹¹ Shapiro characterises the embodied cognition approach as a research *program* to indicate that “the commitments and subject matters of EC [embodied cognition] remain fairly nebulous” (2007, 338).

1.2 Subject and Object

The subject/object dualism is the classic Cartesian distinction between *res cogitans* and *res extensa*. Descartes' doubt had resulted in the distinction between an indubitable mental realm and a distinct physical reality. Further, Descartes maintained that "there need be no resemblance between the ideas which a soul conceives and the movements which cause these ideas" and he cited the example of someone who has been struck in the eye and perceives a flash, which might also have occurred if he had been subject to a bright light (1953b, §131). Accordingly, our experience of objects is not direct, but representationally mediated. Hence, there exists a strict division between the internal, mental subject and the external, worldly object.

As mentioned above, cognitive psychologists consider mental processes to be computational operations instantiated on neural 'hardware'.¹² Because internal mental processes operate on internal mental representations or 'tokens', the subject/object dualism appears to be preserved. Arguably, this approach reaches its zenith in Fodor's argument that concepts are not learned¹³ (2008, 129). Assuming a representational theory of mind and a 'language of thought' (i.e. syntax for the manipulation of mental symbols), learning the concept of, say, GREEN would presumably require formulating the belief (in the language of thought) that GREEN applies to green objects. However, Fodor argues, formulating such a belief *requires* a token of the concept GREEN – such an account of learning therefore *presupposes* the concept is known already. Consequently:

The central issue isn't *which concepts are learned*, since... none of them are. Nor... is it *which concepts are innate*, if an innate concept is one the acquisition of which is independent of experience. Quite likely, there are none of those either. Rather, the problem is to explain how a creature's innate endowment (whether it is described in neurological or in intentional terms) contributes to the acquisition of its conceptual repertoire... (ibid., 145)

Whilst, then, certain sensory inputs are necessary for the 'growth' of concepts, the world itself is quite irrelevant to explaining concept acquisition (at least, in a non-trivial sense). Instead, Fodor conceives concept formation as an essentially internal process.

¹² McGilvray (2009, 109) points out that Descartes actually "offered the rudiments" of a computational theory of vision, and therefore it is not obvious why he did not extend such a theory to the domain of language. Further, the Port Royal Grammarians who followed him did attempt such a theory and "for their time made considerable progress."

¹³ "This conclusion, according to the consensus, was downright loopy; and a fair number of critics, having noted the putative loopiness, chose simply to ignore the argument. Their thought, apparently, was that it's all right to ignore an argument if you dislike its conclusion *very much*" (Fodor: 2008, 129).

Husserl in many ways anticipates themes explored by the existential phenomenologists (see below), but both the epoché and his distinction between immanent and transcendent objects appear to maintain a subject/object dualism. He famously claimed that *“while the being of consciousness... would indeed be necessarily modified by an annihilation of the world of physical things its own existence would not be touched”* and concluded that *“no real being, no being which is presented and legitimated in consciousness by appearances, is necessary to the being of consciousness itself”* (Husserl: 1983, §49). What *precisely* Husserl means by these remarks is unclear, but one implication appears to be that an adequate account of consciousness may restrict itself to the immanent domain and exclude transcendent (i.e. worldly) objects. Such views seemed to persist throughout his work – in his final book, he wrote: *“The spirit, and indeed only the spirit, exists in itself and for itself, is self-sufficient; and in its self-sufficiency, and only in this way, it can be treated truly rationally, truly and from the ground up scientifically”* (Husserl: 1975, Appendix I, §II).

But, Husserl *does* anticipate themes which would later be developed by Gibson in his ‘ecological’ theory of perception. For example, Husserl’s adumbrative account of perception – where movement through an environment yields different adumbrations of objects (see above) – appears to anticipate Gibson’s claim that the vision should not be considered to begin with a retinal ‘image’, but instead various *invariant* features of structured light, i.e. regularities in received light’s structure caused by the objects of the surrounding environment from which it reflects. Because the intensity of reflected light will vary depending on the shape of the object from which it has been reflected, the light may be said to contain information concerning the environment’s structure. The light which converges on a point of observation and carries structure is called by Gibson the ‘ambient optic array’ (Gibson: 1979, 51). As the organism moves through the environment it receives different ambient optic arrays (or different sets of adumbrations), and each array will convey new information about the environment. If the ecological theory has merit then it allows us, first, a better understanding of the actual computational task facing the organism as well as, second, seeing the structure of the objects may be computed by movement as opposed to inferred from a ‘snapshot’. As Shapiro puts it: *“if one conceives of the stimulus for vision as extended in time, rather than as a series of snapshots, the idea that the visual system must infer the structure of the distal layout from an ambiguous proximate stimulus loses its motivation”* (2011, 34). Whether or not Husserl *would* endorse an ecological theory of perception is unclear, however his emphasis on the immanent domain, on the surface at least, seems to divorce subjects from transcendent objects.

Such separation was traced by Heidegger to the Cartesian method by which “the ego becomes the distinctive *sub-jectum* and thus the nature of man for the first time enters the realm of subjectivity in the sense of the ego” (Heidegger: 2003, 87).¹⁴ Heidegger wished to reject this strict division between subject and object, and therefore deliberately avoided using words such as ‘inner’ and ‘outer’ – which implied a sort of ‘gulf’ that needed to be “overcome or transcended by means of a cognitive achievement” (Blattner: 2006a, 11). Heidegger’s phenomenology aims to ‘undercut’ the subject/object dualism by revealing cognition to be grounded in a more basic form of practical concern – for Heidegger, we are primordially acting, not thinking, beings:

...we must keep in mind the point that the usual approach in theory of knowledge, according to which a manifold of arbitrary occurring things or objects is supposed to be homogenously given to us, does not do justice to the primary facts and consequently makes the investigative approach of theory of knowledge artificial from the very start. (Heidegger: 1988, §21a)

Hence, instead of using the term ‘ego’, Heidegger uses ‘Dasein’ – a term which could be translated as ‘being there’ where, crucially, ‘being’ is understood as a *verb*. Dasein therefore emphasises praxis, not cognition.¹⁵ Heidegger’s strategy arguably brings him very close to a number of trends within the embodied cognition research program. First, the emphasis on action accords well with evolutionary concerns involving natural selection: “When we replace formal education and science with the coordination of hunting, gathering, simple industry, and social organisation, comprehension no longer seems to be an archival process” (Barsalou: 1999a, 65). Second, anticipating the ecological theory, the word Dasein is also intended to emphasise the importance of our environmental situatedness: “subject and object do not coincide with Dasein and the world” (Heidegger: 2006, H60). Third, reminiscent of the ‘coupling’ of agent and object (see below), Heidegger provides numerous descriptions of how equipment, when functioning properly, is encountered and used but is *not* salient within experience – that is, we tend not to notice it unless it goes wrong whereupon we explicitly direct our attention to it: “The hammering does not simply have knowledge about the hammer’s character as equipment, but it has appropriated this equipment in a way which could not possibly be more suitable” (ibid., H69).

¹⁴ Taylor points out that “the fateful step” was not the articulation of the method itself, but rather the “reading of the ideal method into the very constitution of the mind. It was one thing to call on us to break down our beliefs into their possibly separate components, another to think that the primitive information that enters the mind must do so in atomic bits” (2006, 206).

¹⁵ I am indebted to Harry Lewendon-Evans for emphasising this point to me.

This account of tool use also meshes nicely with the extended mind hypothesis' idea that the mind is "a *constitutively leaky system*" (Clark: 2001, 160). Clark acknowledges that understanding *only* our physiology or the environment is insufficient to explain our behaviour (ibid., 85), but nonetheless emphasises that, although computational understanding – once obtained – may be independent of physical implementation, the *discovery* of the *relevant* computational description is not (ibid., 86). Biological systems, being evolved from previous (successful) forms, are constrained in their response to certain tasks – however, they are also free to exploit more subtle and efficient processes. The relevant computational solution, then, might reside in highly "environmental interactions and feedback loops so complex that they would quickly baffle a human engineer" (ibid.).

If we are Dasein – if our 'being-there' is integral to our own nature, and if primordially we are actors not thinkers – then the motivation for accepting a subject/object dualism is removed. With this dualism dissolved, the need for 'proof' of the external world also disappears as the very notion of an *external* world loses its sense:

The 'scandal of philosophy' is not that this proof has yet to be given, but that *such proofs are expected and attempted again and again...* It is not that the proofs are inadequate, but that the kind of being of the entity which does the proving and makes requests for proofs has *not been made definite enough...* If Dasein is understood correctly, it defies such proofs, because, in its being, it already *is* what subsequent proofs deem necessary to demonstrate for it. (Heidegger: 2006, H205)

Within cognitive science, this theme manifests in what Clark has termed 'inner symbol flight' (2001, 5). An alternative to the symbolic, algorithmic, computational approach is to model mental processes geometrically using dynamical systems theory (van Gelder: 1998; 1995; Beer: 2003). "Cognitive processes", according to the dynamicists, "may be state-space evolution within these very different types of systems" (van Gelder: 1995, 346). Computational approaches see mental processes as operating on symbols/representations through an ordered but a-temporal sequence of operations, where each sequential set is composed of 'state transitions' and where the states are amenable to a systematic interpretation (van Gelder: 1998, 617). By contrast, the dynamical hypothesis claims "*cognitive agents are dynamical systems*" (ibid., 615) and a system is considered 'dynamical' if it has one or more of the follow characteristics: it operates on numerical values; time itself is a variable such that "amounts of change in state are systematically related to amounts of lapsed time" (ibid. 618); both changes in values and the *rate* of change of those values are

explanatory factors (implying models should be composed of differential equations – *ibid.*, 619). In such explanations there are no representations in the classical sense.

The dynamical approach can also be used to characterise the ‘coupling’ of agents with objects (or, as mentioned above, Dasein’s dealings with equipment). Two interacting dynamical systems that are continuously shaping each other’s changes are considered ‘coupled’ (van Gelder: 1998, 622). Hence, when an agent’s brain, body, and environment are coupled they form a complete dynamical system and “explanatory focus shifts to the properties of this trajectory and the mechanisms by which it is generated and stabilised” (Beer: 2003, 212).¹⁶

Such insights have been applied to language. For example, a Cartesian view of speech perception is expressed by McGilvray when he states that the “syllable /ba/ is in the head” and not “out there” – that “sounds do not issue from people’s mouths” but rather what “issues from people’s mouths when they speak is a series of compressions in the air, not /ba/ or /ta/” (2009, 10). An ecological response would say that perceived air-compressions are *structured* analogously to an ambient optic array and that computational load also, then, can be reduced by recognising that a hearer receives *structured* inputs. Indeed, the reliable presence of regular patterns in (what might be termed) the ‘ambient phonetic array’ is integral to ecological or dynamicist accounts of language (see Beer: 2003 and Elman 1995). The potential of dynamical systems theory to explain language use and, more specifically, grammatical structure will be explored further in the third chapter (below).

1.3 Mind and Body

The mind/body dualism is a specific instance of the more general subject/object dualism (Cooper: 2004). Descartes’ position was not as simple as thinking that the material body must have a soul to move it – as if the body were “an object which needs to be galvanised into action, with the mind doing this job instead of Baron Frankenstein’s bolts of lightning” (*ibid.*, 85). Many actions such as walking or singing, Descartes believed, *can* be explained in mechanistic terms exactly as the movements of other creatures could be explained (Descartes: 1997a, §299). It is *reflective* acts – the explicit awareness of walking or singing – which are not amenable to mechanistic explanation. Neither did Descartes conceive of the soul as a ‘homunculus’, watching a stream of images given to it by the sense organs “as if there were yet other eyes within our brain with which we could perceive it” (Descartes:

¹⁶ Note this is a very different approach to that of ‘Cartesian’ cognitive scientists, who would account for “the sense of a tool as an extension of one’s body” in purely mental (and presumably, neural) terms by “assigning the... [tool] the valuation ‘part of me’” (Jackendoff: 2007, 90).

1985b, §130). Rather, the “soul is really joined to the whole body” and “we cannot say that it exists in one part to the exclusion of all others” (Descartes: 1997b, §351).

Descartes, then, did not believe that human mind is ‘separate’ from the human body – indeed he believed that humanity, as the union of mind and body, “constitutes something that is unique in the whole of creation” (Rodis-Lewis: 1998, 205). However mind, *res cogitans*, is distinct from body, *res extensa*, in that they *could* exist apart: “...in my opinion nothing without which a thing can still exist is compromised in its essence, and although mind belongs to the essence of man, to be united to a human body is in no sense part of the essence of mind” (Descartes: 1997a, §219). Because mind is only *contingently* related to the body, substance dualism is preserved. This, as Princess Elizabeth of Bohemia pointed out to Descartes, created the problem of explaining how *res cogitans* interacts with *res extensa*.¹⁷ Descartes attempted to explain this by claiming that the pineal gland¹⁸ is the “principle seat” of the soul, radiating through the rest of the body via “animal spirits” (Descartes: 1997b, §354), and when the soul wills something, it “brings it about that the little gland to which it is closely joined move in the manner required to produce the effect corresponding to this volition” (ibid. §360). He believed the pineal gland fulfilled this role because he could not “find any part of the brain, except this, which is not double” and because “it must necessarily be the case that the impressions which enter by the two eyes or by the two ears, and so on, unite with each other in some part of the body before being considered by the soul” (Descartes: 1970, 69). In other words, since we have only a single ‘stream’ of conscious experience, the two sets of data must from each of our two sense organs must converge and unify in a single part of the body. Obviously this account begs the question, and Descartes himself was aware of its inadequacy (see Lokhorst: 2011).

This contingency between mind and body has been preserved in cognitive psychology, though not metaphysical substance dualism. Chomsky emphasises that substance dualism became untenable as Descartes’ distinction presupposed a conception of inert, physical matter completely explainable via contact mechanics. Because this conception of matter is irreconcilable with certain observations – especially normal, ‘creative’ language use (see

¹⁷ “...it seems that all determination of movement takes place by propulsion of the thing moved, by the manner in which it is propelled by that which moves it, and by the qualification and shape of the surface of this latter. Contact is required by the required for the first two conditions, and extension for the third. You yourself entirely exclude extension from the notion you have of mind, and a touching seems to me incompatible with an immaterial thing” (Princess Elizabeth of Bohemia, in Descartes: 1952, 270).

¹⁸ Nowadays the pineal gland is known to secrete the hormone melatonin, and is a part of the endocrine system (a system of glands which secrete hormones and regulate the body). Additionally, one oddity with Descartes’ account is that Descartes appears to have mistaken the location of the pineal gland, despite that the gland’s true location had been known for many years (see Lokhorst: 2011).

subsection on self/other, below) – Descartes was led to postulate *res cogitans* (much as Newton would later postulate an attractive ‘force’ – see Chomsky: 2005b, 83). Because *res cogitans* lay beyond the explanatory power of the mechanical philosophy a unification problem arose, as Princess Elisabeth forcefully argued. When Newton discovered further inadequacies in the mechanical philosophy he introduced his ‘attractive force’ – clearly not something which is a part of Cartesian *res extensa*. As Chomsky summarises: “Newton eliminated the problem of ‘the ghost in the machine’ by exorcising the machine; the ghost was unaffected” (ibid., 84). Chomsky therefore concludes that substance dualism could only be resurrected if a new notion of ‘body’ is produced: “Lacking that, the phrase ‘material’ (‘physical’, etc.) world simply offers a loose way of referring to what we more or less understand and hope to unify in some way” (ibid., 84).

Whilst cognitive psychologists do not share Descartes’ belief that the mind cannot be scientifically explained it is nonetheless the case that, in conceiving of mind as computation, the relation between mind and body remains contingent. Whilst it is true that mental algorithms need to be instantiated in physical systems, in principle it does not matter *what* physical system this is:

The key idea is that the answer to the question ‘What makes a system smart?’ is *not the kind of stuff it is made of* or the kind of energy flowing through it, but what the parts of the machine stand for and how the patterns of changes inside it are designed to mirror truth-preserving relationships... (Pinker: 1997, 77 *italics mine*)

According to this paradigm, then, the mind is essentially a formal, computational system implemented on neural ‘hardware’ but theoretically capable of implementation elsewhere.

Husserl’s position on the mind/body relation has been described by Woodruff Smith as a “highly articulate form of many-aspect monism” where his distinctions between “various aspects of body and mind reflect phenomenological distinctions among different ways in which we know, experience, and conceive our bodies and our minds” (Woodruff Smith: 2006, §1). Husserl, then, did not hold that mind and body were different *metaphysical* substances. He wrote: “The complete world is not only physical; it is also psychophysical” (Husserl: 1983, §53) and dismissed Descartes’ substance dualism as an ‘absurd’ “century-old prejudice” (Husserl: 1973, §60). Additionally, Woodruff Smith claims Husserl would have rejected the cognitivists psychologists’ identification of mental processes with algorithmic, computational processes as the formal syntax of the latter do not capture the ‘contents’ or semantics of mental acts (Woodruff Smith: 2006, §1).

However, despite Husserl's rejection of metaphysical dualism, commentators do seem to acknowledge that mind/body dualism is present in Husserl's work (see, for example, Carman: 1999 and Smith: 2006, §III). Husserl made frequent dualist remarks. In the second book of *Ideas* he claimed "sensings pertain to my soul; everything extended to the material thing" (Husserl: 1989, §37), that "*a human being's total consciousness is in a certain sense, by means of its hyletic substrate, bound to the Body*" (ibid., §39), and characterised the body as "a thing 'inserted' between the rest of the material world and the 'subjective' sphere" (ibid., §42). Earlier, in the first book of *Ideas*, he wrote "Consciousness itself... in this psychophysical relationship to something corporeal, loses none of its own essence and can take up into itself nothing alien to its essence" (Husserl: 1983, §53). Later, in *Crisis*, he spoke of the "soul"¹⁹ as 'animating' the "physical living bodies" (Husserl: 1975, §60). As Carman puts it, "a more steadfast commitment to the spirit of dualism is hard to imagine" (1999, 209).

By contrast, in *Phenomenology of Perception* Merleau-Ponty emphasised consciousness and intentionality *as embodied*²⁰ – that we *are* our bodies receives the following phenomenological points in support. First, we can move around, turn toward, or turn away from any object, but we cannot move around, turn toward, or turn away from our bodies – rather, our bodies are the condition for such directionality (see Merleau-Ponty: 2006, 103-5). Second, we use our bodies to move objects, but (barring injury/pathology) "my body itself I move directly" (ibid.: 108). Third, sensations such as pain are not 'caused by' the body, in the same way that pain is caused by the object that hits the body. Rather, pain reveals itself as "localised, that it is constitutive of a 'pain-infested space'" (ibid.: 107). Because we are an embodied consciousness we should understand "motility as basic intentionality" (ibid.: 158) and consider the body to be the "meaningful core" which imposes meaning (ibid.: 170).

Merleau-Ponty's account has inspired and been linked to much subsequent work in cognitive science. The discovery of canonical neurons – those which fire upon both performance and perception of an action – have been taken to imply that we categorise objects according to the types of bodily actions that the object 'affords'²¹ (see Rizzolatti and Craighero: 2004; Gabarini and Adenzato: 2004; Gallese and Lakoff: 2005). Similar ideas have been applied in robotics in the sphere of spatial planning and navigation. When considering

¹⁹ "...the word 'soul' being understood here not at all metaphysically but rather in the sense of the original givenness of the psychic in the life-world" (Husserl: 1975, §60).

²⁰ Heidegger, at least in *Being and Time*, provides only the following brief remark concerning our embodiment (although recognising the topic, he does not – to my knowledge – discuss it in any detail): "This 'bodily nature' hides a whole problematic of its own, though we shall not treat it here" (Heidegger: 2006, H108).

²¹ Arguably, Husserl anticipated 'affordances' also. He spoke of how "the subject *comports itself* towards the object" and "the object *stimulates* or *motivates* the subject" in that "we have 'effects' on the subject emanating from the Objects" (Husserl: 1989, §55).

how a robot might be constructed that can map and navigate through an environment, an obvious strategy would be to build the robot with mechanisms for generating and storing maps which may then be retrieved for use by a central controller system. However the robot of Mataric (1990) adopts a different strategy. It builds a map with landmarks that serve as points of reference, but each landmark is also an *implementation* of a set of behaviours and landmarks are connected to other landmarks by 'motion directives' such that at any given landmark the robot will know how to move in order to reach nearby landmarks. Importantly, then, the robot employs no independent reasoning device – movement decisions are made by *the map itself*. As Clark comments, this robot perfectly illustrates “the idea of action-oriented representations: representations that simultaneously describe aspects of the world and prescribe possible actions, and are poised between pure control structures and passive representations of external reality” (Clark: 1997a, 49).

The use of action-orientated representations also appears to be present in Narayanan's theory of linguistic aspect (1997a and 1997b; see also Feldman and Narayanan: 2004). Narayanan argued that this grammatical category is grounded in the general structure of body's motor commands, and consequently that the understanding of a sentence is achieved with the same routines used to perform bodily movements. The grounding of linguistic symbols in motor processes will be discussed further in chapter 5 (below), which will focus on Narayanan's work. However, here we should note that these examples provide vivid illustrations from the cognitive sciences as to how mental processes are non-trivially embodied, that is, if how bodily actions are *constitutive* of mental processes and thus how a mind/body dualism appears unnecessary.

1.4 Self and Other

If the Cartesian approach isolates a given subject's mental domain, then the question arises of how this particular mental domain can come to know things about other such mental domains, i.e. other subjects. A sceptical philosophical problem also arises: How do we know other such domains exist at all? Descartes pointed to language as a means to solve this problem. In a letter to the Marquis of Newcastle he wrote:

...none of our external actions can show anyone who examines them that our body is not just a self-moving machine but contains a soul with thoughts, with the exception of words or other signs are relevant to particular topics without expressing any passion. (Descartes: 1970, 206)

Descartes pointed out that animals cannot speak, or, rather, whilst they can be trained to imitate words they only seem to be able to use them as “the expression of one of

[their] passions” and seem incapable of conveying abstract notions (ibid. 207). Cordemoy adds that even rocks could convey words should someone have carved the words into the rock-face, but this cannot be sufficient for attributing mind to the rock (Cordemoy: 1668, 8). For the Cartesians, then, linguistic *creativity* – “man’s ability to form new statements which express new thoughts and which are appropriate to new situations” (Chomsky: 2009a, 59) – is the key to solving the problem of other minds: “...if I find by all the experiments, I am capable to make, that they use speech as I do, I shall think, I have an infallible reason to believe that they have a soul as I” (Cordemoy: 1668, 14).

Contemporary cognitive science, in addressing the question of how a given subject gains knowledge of other subjects’ beliefs and desires – that is, how a given subject develops its ‘theory of mind’ – often retains a Cartesian spirit. If methodological solipsism is utilised then the problem is essentially framed as how a subject can come to form mind-*internal* beliefs about the others’ mind-internal beliefs (and desires).²² Jackendoff, for example, postulates theory of mind to be “a collection of predicates deeply integrated into the system of conceptual structure” (Jackendoff: 2007, 191). The natural consequence of such a view is that the “function of language... is to express conceptual structures overtly for the purposes of communication” (ibid. 193). Further, returning to the more sceptical issue, Chomsky writes:

There is no serious reason today to challenge the Cartesian view that the ability to use linguistic signs to express freely-formed thoughts marks the ‘the true distinction between man and animal’ or machine, whereby ‘machine’ we mean the automata that captured the imagination of the seventeenth and eighteenth century, or those that are providing a stimulus to thought and imagination today. (Chomsky: 2005b, 3)

Husserl, by contrast, provides an account of intersubjectivity based on ‘empathy’. After implementing the epoché, the phenomenologist is essentially in a state of ‘transcendental solipsism’, where others are transcendent objects. Empathy, understood not as an emotional understanding of others’ mental life but as a stratum which necessarily *precedes* such understanding, makes possible an ‘aesthesiological layer’ of the other ego:

It is only with empathy and the constant orientation of empirical reflection onto the psychic life which is appresented along with the other’s Body and which is continually taken Objectively, together with the Body, that the close unity, man, is constituted, and I transfer this unity subsequently to myself. (Husserl: 1989, §46)

²² Accounts of ‘theory of mind’ can often be classified as either ‘theory-theories’ or ‘simulation-theories’. The former considers that the mind must actively make theoretical, inferential ‘judgements’ concerning the mental states of others. The later, roughly, postulates that our understanding of others comes from an ability to ‘put ourselves in their shoes’. (See Gallagher and Zahavi: 2010 and Ratcliffe: 2008 for critical discussions.)

Empathy therefore makes possible the other's body as a 'lived body' or field of sensations (Mohanty: 2006, 71). 'Empathetic positing' is not a *real* connection to other subjects, but is rather 'mediate', or an 'appresentation' of the other (ibid., 72). That this account is mediate suggests the self/other dualism was not satisfactorily overcome in Husserl's work – Husserl himself claims that "each subject... remains ineluctably distinct from every other by means of an abyss" (Husserl: 1989, 309). It might also be added that Husserl told Schutz that the second book of *Ideas* remained unpublished due to his dissatisfaction with its account of intersubjectivity (see Schutz: 1953, 365).

In all the above accounts intersubjective knowledge is mediated: Descartes believed our knowledge of others to be mediated by language; questions of (predicative) beliefs concerning others' mental states require sensory and/or linguistic mediation; Husserl's account of empathy makes others transcendent – something not perceived but apperceived. Merleau-Ponty, in contrast, would insist that we perceive the other *immediately*: "I do not see anger or a threatening attitude as a psychic fact hidden behind the gesture, I read anger in it. The gesture *does not make me think* of anger, it is anger itself" (Merleau-Ponty: 2006, 214). We are embodied consciousnesses, and when we perceive gesture and action we perceive the consciousness of the other. Recently, the discovery of mirror neurons has been interpreted as giving weight to Merleau-Ponty's view. Mirror neurons are motor neurons which fire both when an action is performed by the subject *and* when the subject perceives another agent perform that particular action. Crucially, mirror neurons respond to *actions* – such as grasping – rather than simply movement – such as pointlessly extending a limb. Rizzolatti and Craighero (2004) performed several experiments which revealed the importance of embodiment for interpersonal understanding. Mirror neurons were found to fire when the subject was presented with an action which was a part of their repertoire, but did not fire otherwise. This applied across species-boundaries, i.e. a human's mirror neurons will fire when they observe a hand grasping, whether the hand belongs to a human or a monkey (Shapiro: 2009, 448).

Due to their role in intersubjective understanding, mirror neurons have been theorised to play a crucial role in linguistic comprehension by Rizzolatti and Arbib (1998), who also consider them to be a "neural prerequisite" for language: "Our proposal is that the development of the human lateral speech circuit is a consequence of the fact that the precursor of Broca's area was endowed, before speech appearance, with a mechanism for recognizing actions made by others" (1998, 190).

1.5 Language and Meaning

In his *Logical Investigations*, Husserl talked of acts of 'intimation' which, by ascribing meaning to any given act of speech, provides the auditor with an insight into the experiences of the speaker (Mohanty: 2006, 71). If language is to be capable of conveying any meaning intimated by consciousness, then, believed Husserl, the grammatical forms of language must 'mirror' the forms of meaning. Hence, Husserl developed a theory of universal grammar, viewed as a theory of 'meaning-forms'. This concern with universal grammar was intended to provide a "much needed foundation" for logic (Husserl: 2001b, IV §13). Husserl wished to demonstrate the existence of a single objectively binding logic²³ and (following Bolzano) conceived of logic as the principles which governed the real of abstract, ideal meanings (see *ibid.*; see also Simons: 2006).

According to Husserl, *all* languages (e.g. English, French, Navajo, etc.) must have certain grammatical forms *in order to be a language*. Husserl's investigation is, like the rest of his philosophy, *eidetic* – or, in Husserl's later terminology, the theory of universal grammar is the 'regional ontology' in which the empirical studies of specific languages are founded. On Husserl's account, the essence of language is a set of formal, pure, *a priori* forms of meaning:

In general we recognise... every concrete meaning represents a fitting together of materials and forms, that each such meaning falls under an ideal pattern that can be set forth in formal purity, and that to each such pattern an *a priori* law of meaning corresponds. (Husserl: 2001b, IV §10)

Hence, any and every spoken language must possess these forms in order to communicate meaningful expressions (e.g. 'Is the glass half full or half empty?') and avoid producing unintelligible, gibberish (e.g. '*The is? glass full half half empty or'). The laws of meaning therefore provide those of logic with intelligible subject-matter. However, although all languages instantiate this essential "ideal framework", each "actual language will fill up and clothe differently, in deference either to common human motives or to empirical motives that vary at random" (*ibid.*, §14). The project of detailing such a universal grammar was not, however, taken up by Husserl though universal grammar did become a serious topic of research with the advent of generative linguistics.

Although there are some significant differences between Husserl and the generative linguists, they share a Cartesian presupposition that meaning resides within the domain of the mental and is absent from non-mental things. Husserl, in keeping with his distinction between

²³ In particular he was concerned with refuting psychologism – the doctrine that "the laws of logic are descriptions of regularities in the way we think", implying that different logics are possible on the basis of different ways of thinking (Simons: 2006, 106).

that which is immanent to consciousness and that which is transcendent, believed linguistic expressions to have meaning insofar as they are *given* meaning through (parts/moments of) cognitive acts (Smith and Woodruff Smith: 2006, §V). In generative linguistics, this Cartesianism can be seen in the distinction between semantics and syntax. The former concerns 'conceptual structure': "Conceptual structure *is not part of language per se* – it is part of thought... it is the cognitive structure in terms of which reasoning and planning takes place" (Jackendoff: 2003, 123, *italics mine*). The latter is grammatical structure, i.e. a part of language. Hence, language *externalises* thought, but does not *constitute* or *structure* it.

Grammar, then, "cannot be identified with 'meaningful' or 'significant' in any semantic sense" (Chomsky: 2002, §2.4). This, maintains Chomsky, is strongly implied in examples such as the following (taken from *ibid.*):

- (1) Colourless green ideas sleep furiously
- (2) *Furiously sleep ideas green colourless

And:

- (3) The book seems interesting
- (4) *The child seems sleeping

Both (1) and (2) are "equally nonsensical", says Chomsky, "but any speaker of English will recognise that only the former is grammatical" (*ibid.*, §2.3). Additionally, says Chomsky, there is no semantic reason to prefer (3) to (4) – we can still understand (4) as meaning 'the child seems to be sleeping' despite it being ungrammatical. Hence, from its inception generative linguistics held: "Grammar is best formulated as a self-contained study independent of semantics... the notion of grammaticalness cannot be identified with meaningfulness" (*ibid.*, §10).

Methodological solipsism is also very much present in generative linguistics, visible in Chomsky's distinction between competence and performance as well as his notion of 'I-language'. Linguistics, Chomsky maintains, is concerned with "an ideal speaker-listener" and should therefore ignore "such grammatically irrelevant conditions such as memory limitations, distractions, shifts of attention and interest, and errors (random or characteristic)" (Chomsky: 1965, 3). He therefore draws a distinction between 'competence' and 'performance', that is, between *knowledge* (the 'state' which makes possible the linguistic abilities) and *use* (actual linguistic acts, e.g. speech, writing, etc.). Competence, rather than performance, is therefore the object of study in linguistics.

The linguistic competence of the ideal speaker-listener is termed their 'I-language', where 'I' indicates that language is considered as *internal* to the organism, as a mental 'faculty' or 'organ'.²⁴ In accord with the approach of cognitive psychology (see chapter 1, above), that language is considered a mental phenomenon should not be taken to imply a commitment to substance dualism. Rather:

The biolinguistic perspective views a person's language in all its aspects – sound, meaning, structure – as a state of some component of the mind, understanding 'mind' in the sense of eighteenth-century scientists who recognised that after Newton's demolition of the 'mechanical philosophy', based on the intuitive concept of a material world, no coherent mind-body problem remains, and we can only regard aspects of the world 'termed mental', as the result of 'such an organical structure as that of the brain', as chemist-philosopher Joseph Priestly observed. (Chomsky: 2010, 173)

Generative linguistics therefore characterises itself as a branch of psychology and, ultimately, biology. This stands in contrast to theories concerning 'E-languages', where an E-language might be defined as a set of cultural/social conventions distinct from mental properties.^{25, 26}

Because an I-language is internal to the organism, 'I' may also stand for 'individual' and, correspondingly, 'E' in 'E-language' may also mean 'external'. Hence, any given I-language is considered to be instantiated in the mind/brain of a specific individual, and therefore two individuals might have different I-languages but enough areas of overlap such that we consider them both speakers of a particular E-language, e.g. English (Chomsky: 2005b, 72). Finally, 'I' may stand for 'intensional' and 'E' may stand for 'extensional'. Two grammars are considered *extensionally* or 'weakly' equivalent if they enumerate the same strings of words, however two extensionally equivalent grammars need not be *intensionally* equivalent, that is, they need not use the same rules to generate those strings and thus might assign different structures to those strings (Smith: 2009, 140). This point can be made clearer by considering

²⁴ At least three differences between Husserl and Chomsky are visible at this point. First, Husserl adopts an eidetic/Platonic approach concerned with essential structures underlying particular *E*-languages. Chomsky's program, by contrast, is concerned with *I*-language and hence linguistics is conceived of as a part of psychology and biology. Second (but related), Husserl did not share Chomsky's enthusiasm for faculty psychology: "we shall be no the wiser... if... we try to explain the art of dancing by the dancing faculty, i.e. the faculty of dancing artfully, the art of painting by the painting faculty, etc." (Husserl: 2001a, I §58). Third, Husserl's theory of UG is based on *meaning*-categories, i.e. the forms of grammar 'mirror' those of meaning, whereas Chomsky strictly separates meaning and grammar, i.e. grammatical structure does not correlate with semantic structure.

²⁵ Chomsky considers E-languages to be epiphenomena at best and to have little or no significance for linguistics (see 1986, §2.4.1).

²⁶ Chomsky's competence/performance distinction is analogous to Saussure's distinction between language and speech (*langue/parole*). However, Saussure's 'language' (*langue*) denotes *E*-language, whereas Chomsky's 'competence' denotes "the Humboldtian conception of underlying competence as a system of generative processes" (Chomsky: 1965, 4), i.e. the state of the language faculty, that is, *I*-language.

cases of expressions which are weakly/extensionally equivalent, i.e. composed of the same symbols in the same order, but are interpreted differently due to their different grammatical structures:

Listening to the radio I recently heard a news report of a ‘black cab driver’. I interpreted this as having the structure [black] [cab driver], and was mildly irritated that the reporter should consider the race of the driver relevant. It soon became clear that what had been intended was [black cab] [driver] – the driver of one of London’s black cabs... The example is revealing, as different phrases require one or the other analysis in order to be interpreted rationally: a *magnetic soap holder* and a *speckled trout cooker* are structurally ambiguous, like *black cab driver*, but only one interpretation of each is likely to be appropriate in the world in which we live. (ibid., 144)

Because the grammar of a language must not just account for the linear order of symbols, but also for an expression’s structure, I-language must be considered “a function enumerating structural descriptions, considered in intension with a particular description” (Chomsky: 2005b, 70).

A theory purporting to be a description of a given speaker’s competence, i.e. their I-language, is termed its ‘grammar’ and the initial state of their mental language faculty is termed ‘universal grammar’ (Chomsky: 1965, 4; 2005b, 73). Since a grammar must be a finite set of procedures for generating an infinite domain of phrases and sentences, the theory is more adequately called a ‘*generative grammar*’ (Chomsky: 2005b, 5). Further, because an I-language must be regarded as intensional, Chomsky characterises a generative grammar as “a system of rules that in some explicit and well-defined way assigns structural descriptions to sentences” (Chomsky: 1965, 8).

It is worth emphasising that Chomsky’s theory of competence does not represent a *process* for the production of sentences, but rather a *state* – i.e. “the condition of knowing a language” (Harris: 1993, 100). Alternatively, as Aitchinson puts it, Chomsky’s program is not concerned with sentence processing procedures but sentence *relatedness* (2011, vii). But, this account is made “in process terms, replete with all the production-line vocabulary” and, as Harris notes, “[n]o single word is more troublesome here than *generative*” (Harris: 1993, 100). The word ‘generate’ should *not* be taken to refer to a process by which expressions are produced. Rather: “To say that a grammar ‘generates’ a certain set of structures is simply to say that it *specifies* this set in a precise way” (Chomsky: 2010, 91, *italics mine*). ‘Generate’ is thus used in its mathematical sense, denoting an abstract notion similar to ‘delineate’, ‘define’, and ‘enumerate’ (Harris: 1993, 100). A generative grammar is therefore an idealisation, which

abstracts from the performance limitations of actual biological systems (Berwick et al.: 2011, 1218). As Chomsky puts it:

...a generative grammar is not a model for a speaker or a hearer. It attempts to characterise in the most neutral possible terms the knowledge of the language that provides the basis for the actual use of language by a speaker-hearer. When we speak of a language as generating a sentence with a particular structural description, we simply mean that the grammar assigns this structural description to the sentence. When we say that a sentence has a certain derivation with respect to a particular generative grammar, we say nothing about how a speaker or hearer might proceed, in some practical or efficient way, to construct such a derivation.^[27] These questions belong to the theory of language use – the theory of performance. (Chomsky: 1965, 9)

In chapter 3 (below) I will return to generative linguistics, arguing that some of its insights concerning linguistic structure and its criticisms of alternative approaches to linguistics should be taken very seriously. However, here it is sufficient to note the distinction between language (including grammatical structure) and meaning, and the use of methodological solipsism. The approach to language adopted by existential phenomenologists and proponents of embodied cognition rejects both. With the emphasis on praxis over cognition, work within embodied cognition tends to propose that language is – and, in evolutionary terms, was – a means of controlling action in specific situations as opposed to a means to “archive information, as it is in formal education and science” (Barsalou: 1999a, 65). Further, viewing language as a ‘tool’ implies a ‘supra-communicative’ view whereby the words of a public (E-)language function as “a sort of cognitive building block” (Clark: 2001, 144). On this account, words are internalised and function as objects which may then be targeted by biologically basic mental abilities, allowing us to overcome problems that would otherwise be beyond our ‘naked’ brain: language is thus conceived as a ‘tool for thinking’, or a ‘cognitive technology’. This theme will be more fully explored in chapter 3; here I instead on how given tools might affect the way we think and the implications for methodological solipsism.

Existential phenomenologists have also regarded language as more than a means for the expression of internal thoughts. In an explicit rejection of Cartesianism, Merleau-Ponty writes in the *Phenomenology of Perception* asserts that “*the word has a meaning*” (Merleau-Ponty: 2006, 206) and that “words, vowels and phonemes are so many ways of ‘singing’ the world, and their function is to represent things not, as the naïve onomatopoeic theory had it,

²⁷ Chomsky seems to be quite vague regarding the relation between the competence and performance systems: “No doubt, a reasonable model of language use will incorporate, as a basic component, the generative grammar that expresses the speaker-hearer’s knowledge of the language; but this generative grammar does not, in itself, prescribe the character or functioning of a perceptual model or a model of speech production” (Chomsky: 1965, 9).

by reason of an objective resemblance, but because they extract, and literally express, their emotional essence” (ibid., 217). What exactly Merleau-Ponty means by these remarks is unclear, but perhaps some experiments concerning the effects on cognition of gendered words might convey Merleau-Ponty’s meaning.

Assignment of gender to words is obviously arbitrary in that many of the indicated objects have no biological gender. Additionally, those with biological gender are often *not* given matching linguistic gender. As Mark Twain put it: “In German, a young lady has no sex, while a turnip has... a tree is male, its buds are female, its leaves are neuter; horses are sexless, dogs are male, cats are female... tomcats included” (quoted in Boroditsky and Philips: 2002, 929). For this reason, it is understandable that Boroditsky and Philips refer to gender as a ‘quirk’ or ‘fluke’ of language (ibid., 933). In English the pronouns ‘him’ and ‘her’ do denote gender, but English tends not to make much use of gender as words for objects are not treated as masculine or feminine.²⁸ Hence there do not seem to be any effects on the cognition or experience of English-speakers due to linguistic gender. But there *does* seem to be experimental evidence for the presence of such effects in native speakers of those languages which do make use of grammatical gender. In this regard it is interesting to quote Vygotsky, who provides an interesting example of where it was more important to translate the word’s gender accurately than it was to translate the word itself:

In translating the fable ‘The Grasshopper and the Ant’, Krylov substituted a dragonfly for La Fontaine’s grasshopper. In French, *grasshopper* is feminine and therefore well suited to symbolise a lighthearted, carefree attitude. The nuance would be lost in a literal translation, since in Russian *grasshopper* is masculine. When he settled for *dragonfly*, which is feminine in Russian, Krylov disregarded the literal meaning in favour of the grammatical form required to render La Fontaine’s thought. (Vygotsky: 1993, 222)

The point is not that the grammar of gender is used by a reflective consciousness to explicitly draw attention to certain masculine/feminine characteristics of an object (though that certainly *could* happen), but that the grammar of gender selectively biases our pre-reflective perception/cognition. Shapiro has suggested that to learn objects’ arbitrary grammatical genders, the mind needs to focus on the stereotypical masculine/feminine properties of that object – focusing on a cat’s grace if ‘cat’ is grammatically feminine, or a dog’s aggressiveness if ‘dog’ is grammatically masculine (2011, 74). If true, this would imply

²⁸ There might be exceptions – in English, ships are frequently treated as feminine, referred to with the pronoun ‘she’. Further, as Konishi points out, ‘he’ traditionally denotes a person of unspecified gender (1993, 520).

that a given language will influence the way its speakers perceive, and perhaps conceive, of the world.

Jackobson seems to have believed this, maintaining that “the grammatical categories carry a high semantic import” (1966, 236) and citing a study at the Moscow Psychological Institute showing that Russians are prone to personifying Monday, Tuesday and Thursday as males, and Wednesday, Friday and Saturday as females, *without* realising that these personifications corresponded to the days’ grammatical genders (ibid., 237). Konishi tested both German and Spanish speakers by asking them to rate a series of nouns in terms of their ‘potency’, where nouns were chosen for inclusion in the series because if they were of masculine gender in German they were feminine in Spanish, and vice versa. Both groups of speakers consistently rated as more potent the nouns which were assigned masculine gender in their own language (1993, 530). Meanwhile, Sera et al. tested both English and Spanish speakers on whether objects seemed more masculine or feminine, finding that, first, Spanish speakers tended to view as masculine or feminine those objects with masculine or feminine grammatical gender respectively (1994, 273) and, second, found the same trend when the subjects were asked to attribute a man or a woman’s voice to each in a series of object shown (ibid., 276). By contrast, English speakers displayed a slight propensity to honour “an artificial-male/natural-female conceptual division” (ibid., 287).

However, as Boroditsky et al. (2003) argue, the above evidence, although suggestive, is not necessarily convincing for at least three reasons. First, since speakers were tested in their native tongues there is no clear indication that language exerts interesting effects on thought, i.e. effects *outside* the linguistic domain (for example, that the gender assigned to days of the week genuinely influences non-linguistic thought regarding the days themselves). Second, since instructions given to the experiments’ subjects had to be translated, there is a substantial risk that a shift of meaning occurred *during* the translation and, consequently, any cross-linguistic variation results from speakers of one language following a different set of instructions to those of the other:

...even if the task is non-linguistic, and participants are asked simply their language’s equivalent of ‘which one is the same?’, one cannot be sure that the words used for ‘same’ mean the same thing in both languages. If in one language the word for same is closer in meaning to ‘identical’, while in the other language it is closer to ‘relationally similar’, speakers of different languages may behave differently, but only because of the differences in instructions, not because of any interesting differences in thought. (Boroditsky et al.: 2003, 67)

Third, such experiments required subjects to make a *conscious* judgement and therefore left open the possibility that subjects *chose* to use their language's gender assignment as a strategy when answering questions such as 'Is an apple more masculine or feminine?' Consequently, such experimental data is not necessarily evidence for linguistic influences on our *non-linguistic* and/or *pre-reflective* thought about/perception of objects.

To overcome such limitations, Boroditsky and Philips (2002) conducted a series of experiments during which native speakers of both German and Spanish were asked to compare the similarity of human males or females to a series of objects (natural, artificial, or animals) – the 'picture similarity experiment' – where the experiment was conducted in English and, in one variant, where an attempt was made to tie up the 'linguistic faculties' by having subjects perform an additional task of verbal shadowing (i.e. repeating randomly generated English letters that were being played during the picture similarity task). Like Konishi's experiment (1993), each object was either masculine in German and feminine in Spanish or vice versa. Subjects found greater similarity between objects and people when grammatical and biological gender matched in their native language, suggesting "Spanish and German speakers indeed end up thinking about objects as more similar to biological males and females, depending on the object's grammatical gender in their native language" (Boroditsky and Philips: 2002, 929). When this same test was performed with subjects proficient in *both* German and Spanish, experimenters observed a significant positive correlation between the degree to which the subject was more proficient at either German or Spanish, and the extent to which their ratings of similarity agreed with the grammatical gender of the object in their more proficient language (ibid., 930). The additional task of verbal shadowing, when required, seemed to make no difference to these results (ibid., 932).²⁹

These studies are particularly interesting because they indicate that there might be subtle effects on our cognition or experience due to the language we speak – in this case, that certain objects appear to speakers of gendered languages as being more stereotypically masculine or feminine. In this regard it is interesting to take note of the adjectives used by subjects in the preceding experiments to describe the objects shown to them:

²⁹ This said, the experimenters concede that there "seems to be no sure way to disable all linguistic processes (and this is not in small part due to the difficulty in deciding on what counts as linguistic and non-linguistic processing in the first place)" (Boroditsky and Philips: 2002, 933). As a result, it will always be possible to doubt that *all* the linguistic faculties have been properly interfered with, but, whilst not conclusive, the data is certainly suggestive.

...the word for 'key' is masculine in German and feminine in Spanish. German speakers described keys as *hard, heavy, jagged, metal, serrated* and *useful*, while Spanish speakers said they were *golden, intricate, little, lovely, shiny*, and *tiny*. The word for 'bridge', on the other hand, is feminine in German and masculine in Spanish. German speakers described bridges as *beautiful, elegant, fragile, peaceful, pretty*, and *slender*, while Spanish speakers said they were *big, dangerous, long, strong, sturdy*, and *towering*. (Boroditsky et al.: 2003, 70)

However, interesting though these effects are, the question is 'are they linguistic?' Arguably, such differences in conception have nothing to do with language as such, but instead is a product of cultural differences of opinion which language is merely being used to express. Evidence that such effects *are* linguistic comes from another variant of the picture-similarity test – this time, where English speakers were taught the 'oosative-soupative' distinction from the fictional Gumbazi language. Subjects were informed that Gumbazi has two words for 'the' – 'oos' and 'sou' – and that each noun was either oosative (requiring 'oos') or soupative (requiring 'sou'). Both the oosative and the soupative always corresponded to a biological gender (as well as encompassing a wide variety of other objects), but for half the subjects the oosative was correlated to the female gender and the soupative to the masculine, and for the other half the correlation was reversed (Boroditsky and Philips: 2002, 931). Having been trained on which objects were considered oosative and which soupative, subjects performed the picture-similarity test and rated pairs where grammatical and biological gender corresponded as more similar than when they did not (ibid.). Once again, the choice of adjectives used to describe such objects is revealing:

...when the violin was grammatically feminine in Gumbazi, English speakers described a picture of a violin as *artsy, beautiful, creative, curvy, delicate, interesting, pretty*, and *wooden*. When it was grammatically masculine, English speakers described it as *chirping, difficult, impressive, noisy, overused, piercing, shiny, slender, voluptuous*, and *wooden*. (Boroditsky et al.: 2003, 71)

On the basis of such results, the experimenters concluded that "differences in grammar, with no concomitant differences in culture, are enough to influence how people think about objects" (ibid., 72).³⁰ That any given language might alter how people perceive or conceive the world might illustrate Merleau-Ponty's assertion that the word has meaning, and might shed light on what he means by speech being a means to 'sing' the world in a melody of words. In the first place, the gender of words may presumably be considered a part of the

³⁰ It is perhaps also worth mentioning that if gender assignment does influence experience and cognition, the political question arises of whether languages carry within them gender biases – whether gender oppression is somehow 'founded' in language due to the language's characterisation of certain traits as masculine or feminine. This is, however, not a question I will engage with here.

word's meaning. In the second, the differences in the perceptual/cognitive effects bestowed by different languages might be considered differences in ways of seeing the world.

Such an approach to language thereby contrasts markedly with the Cartesian perspective of both Husserl and generative linguistics, which view meaning as being given to linguistic expressions through acts of intimation (Husserl) or as belonging to an independent semantics (generative linguistics). Importantly, this account employs a conception of public language which clashes with generative linguistics' emphasis on language as internal and individual. If words are cultural objects which are internalised, then it follows that an adequate conception of language and meaning cannot remain internal to a single agent.

1.6 Summary

This chapter has attempted to introduce various theories referred to throughout the rest of this thesis. The first section gave an overview of Husserl's phenomenology, concentrating on, first, his Cartesian method of phenomenological reduction and existential phenomenology's criticisms and, second, the 'critical' nature of Husserl's genetic phenomenology. Both of these themes recur throughout this thesis.

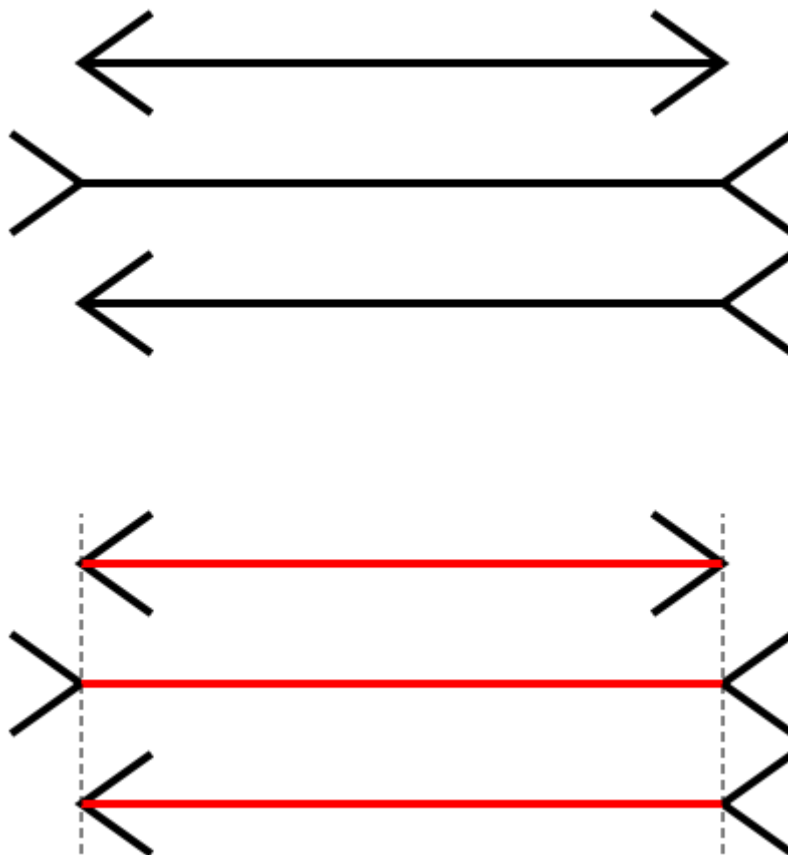
The epoché was linked to methodological solipsism in the cognitive sciences and contrasted with the existentialist phenomenologists' view that an adequate phenomenology reveals the impossibility of a solipsistic method. Three Cartesian 'dualisms' were used to illustrate this point in the three subsequent sections. In each section I aimed to show how existential phenomenologists sought to dissolve each dualism, in each case contrasting philosophical positions linked to the Cartesian paradigm with those related to the embodied cognition research program. The final section turned explicitly to language, noting the use of methodological solipsism in generative linguistics and emphasising the divide between language and meaning. The next chapter is an effort to undermine this language/meaning dualism by using Merleau-Ponty's arguments against the perceptual constancy hypothesis to argue against a 'linguistic constancy hypothesis' (a constant relation between sound and meaning). The example of gendered words used above might speak in favour of words themselves having meaning, but in the next chapter I wish to suggest that grammatical structure plays an important role in structuring meaning.

Husserl's concern with the experiential basis of our judgements – or the 'origin of reason' investigated by genetic phenomenology – was, as noted in the introduction, apparently shared by Merleau-Ponty in his project on the origin of truth. Whilst I will be arguing in chapter 3 that grammatical structure is important for this project, chapters 4 and 5

might be considered 'genetic' in that they trace the origin of certain functional categories – determiners and aspect – to embodied experience.

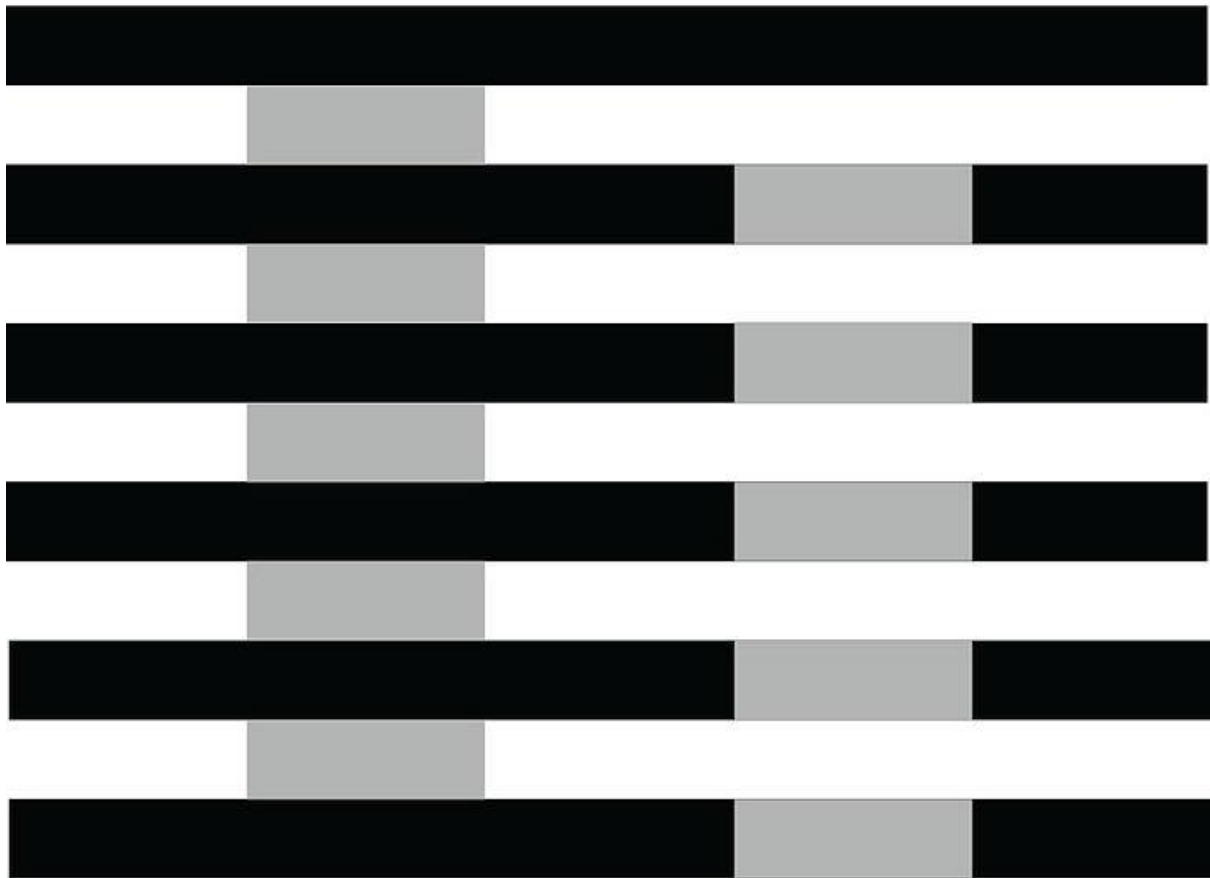
2. The Constancy Hypothesis

The opening chapters of *Phenomenology of Perception* engage in a critique of the concept of ‘sensation’. Whilst Merleau-Ponty acknowledges the extensive use of the concept, he also believes that “nothing could be more confused” and that, because of this reliance on sensation, “traditional analyses [have] missed the phenomenon of perception” (Merleau-Ponty: 2006, 3). It is often supposed that there is a “point-by-point correspondence and constant connection” (ibid., 8) between the object perceived and the sensation, i.e. the ‘data’ or ‘impression’ received by the organism’s sensory apparatus. However, as Carman puts it, this constancy hypothesis “immediately confronts a plethora of counterexamples” (Carman: 2008, 49). For example, given that the sensation would be the same, how do we account for the well-known effect of perceiving the horizontal lines in the Müller-Lyer illusion as being of different lengths?



Alternatively, consider White’s illusion: how does the constancy hypothesis explain that the *same* shade of grey is perceived as being of two different shades (‘A’ and ‘B’)?

B



44

has no significance” as, in the case of the former, “the given stimuli or ‘states of mind’ call it [the word] up in accordance with the laws of neurological mechanics or those of association” and, in the case of the latter, the word “is only the external sign of an internal recognition... remaining an empty container” (ibid., 205). Consequently, “we refute both intellectualism and empiricism by simply saying that *the word has a meaning*” (ibid., 205).

The approaches to language from existential-phenomenological and embodied cognition were outlined in the previous chapter. Here I elucidate Merleau-Ponty’s criticisms of the constancy hypothesis – focusing on the empiricist position in the first section, before turning to his critique of intellectualism in the second. In each section I suggest that these criticisms might be applied to empiricist and intellectualist accounts of language, specifically their apparent assumption that there exists a constant link between word/signifier and concept/signified, or – in the case of behaviourism – stimulus and verbal response.

The first section of this chapter focuses on empiricist conceptions of language, revisiting behaviourist conceptions that attempted to account for language in terms of ‘operant conditioning’ before moving onto a more recent associationist conception where it is asserted that word meanings are learned in virtue of being associated with salient aspects of experience. Merleau-Ponty criticised the empiricist account of perception for being both obscure and circular, and I suggest that these empiricist accounts of language suffer analogous problems. They are obscure because they only assert that the meaning of a word is given in the link to a given stimulus or a salient aspect of experience. However, they seem hard pressed to account for how this link is actually established, what stimuli or responses are and how they may be identified, and what associations might enable the systematic and subtle alteration of word-meaning that we see with grammatical structure – and their attempts to provide such an account seem to presuppose what they intend to explain.

The second section concerns the intellectualist account, focusing on Jackendoff’s account of linguistic experience. Jackendoff argues that phonology is necessary and sufficient for linguistic experience, and that neither syntax nor semantics are either necessary or sufficient. I draw on a number of studies in psycholinguistics – focusing on the phenomena of click displacement and speech compression – in order to undermine Jackendoff’s strict distinctions. Instead of consisting of phonological qualia, I suggest that linguistic experience is characterised by meaningful expressions through which words get their meaning.

There is, however, one important difference between the criticism of the perceptual and linguistic constancy hypotheses concerning ‘judgment’. Merleau-Ponty argues that the intellectualist notion of judgement cannot account for the phenomenology of perception.

However, a 'supra-communicative' view of language would, in virtue of considering language constitutive of thought, consider the notion of judgement *inextricable* to linguistic experience, albeit a different notion of judgement to that of the intellectualist account. This raises the question of how judgement is possible, which is addressed in subsequent chapters.

2.1 Behaviourism and Empiricism

The behaviourist aims to preserve the perceptual constancy hypothesis by claiming sensations are modified via associations or memory following prior repeated exposure to stimuli. In his criticism of this position, Merleau-Ponty aims to reveal a catch-22 in the empiricist's use of 'sensation': sensation alone cannot account for the unity of perceptual experience (as demonstrated by the cases of perceptual illusion, above); however, the postulated auxiliary hypotheses, aside from leaving the concept of sensation obscure, *presuppose* the unity of the perceptual experience which is what they attempt to explain.

Merleau-Ponty believes that the behaviourist account is obscure because, given that sensations are associated with previous sensations, associationism only informs us *that* some sensations elicit others, not *how*, i.e. in virtue of what features or powers, they actually do so (Carman: 2006, 56). Hence, maintaining that perception of one shape elicits associations of previous perceptions of that shape implies knowledge to be "a system of substitutions in which one impression announces others without ever justifying the announcement" and overlooks the need for these sensations to be *identified* – this identification being precluded by the behaviourist perspective itself, where sensations "can only be indissolubly associated and everywhere substituted for each other" (Merleau-Ponty: 2006, 17). Behaviourism therefore gives no indication of how a transition may be effected from a set of discrete, atomistic sensations to a unified, perceptually coherent gestalt (Carman: 2006, 56). Thus, Merleau-Ponty writes that the "significance of the percept is nothing but a cluster of images which begin to reappear without reason" (Merleau-Ponty: 2006, 17).

Such a position, contends Merleau-Ponty, is also circular. Accounts based on association presuppose perceptual unity, which is the very thing they are invoked to explain – for otherwise it would be unclear which discrete units of sensation should be associated with which other discrete units of sensation: "There are not arbitrary data which set about combining into a thing because *de facto* proximities or likenesses cause them to associate; it is, on the contrary, because we perceive a grouping as a thing that the analytical attitude can then discern likenesses or proximities" (ibid., 18). Because association requires things to already have a basic character, the unity of a thing in perception is a *condition*, not a construction, of association.

Similarly, accounts based on memory presuppose that the data is already structured: “in order to recall a former image which present perception resembles, the latter must be *patterned* in such a way that it can sustain this resemblance” (ibid., 21). Therefore any appeal to memory “presupposes what it is supposed to explain; the patterning of data, the imposition of meaning on a chaos of sense-data” and hence as soon as memory is “made possible than it becomes superfluous, since the work it is being asked to do is already done” (ibid., 21).

Merleau-Ponty concluded that behaviourism “describes only blind processes which could never be the equivalent of knowledge, because there is, in this mass of sensations... *nobody who sees*” (ibid., 25). His criticism of the behaviourist’s account of language is also made in similar terms – that on the behaviourist account there is no subject and thus no one who may engage in an *act* of speech: “speech is not an action and does not show up the internal possibilities of the subject: man can speak as the electric lamp becomes incandescent” (ibid., 203). Indeed, B. F. Skinner’s remarks on language – or ‘verbal behaviour’ – would seem to support Merleau-Ponty’s verdict:

Whenever we demonstrate that a variable exerts functional control over a response, we reduce the contribution of any inner agent. For example, if we can show that the occurrence of a response is due to the presence of a stimulus of specified properties, then it is not necessary to say that a speaker uses the response to describe the stimulus. (Skinner: 1957, 311)

For the behaviourists, language is simply an arbitrarily large set of conditioned responses. Despite its apparent complexity, behaviourists nonetheless assert that, in essence, language “in the beginning [is] a very simple type of behaviour. It is really a manipulative habit” (Watson: 1931, 225). In support of this, Watson describes the following experiment:

My wife and I attempted to form a simple verbal habit in a very young infant. The experiments were carried out upon B.... He was born November 21st, 1921. Up to the end of the 5th months he showed merely the repertoire of almost every other child of that age. The cooing sounds, ‘ah goo’ and variations of ‘a’ and ‘ah’ were quite pronounced. We began on the 12th of May to tie this sound up to the bottle (this infant was bottle fed from the end of the second month). Our method was as follows: We gave him the bottle and allowed him to nurse for a moment, then we took it away and held it in front of him. He began to kick and squirm and reach for it. We next gave the stimulus sound ‘da’ aloud. We repeated this procedure once per day for three weeks. When he began to whimper and whine we always gave him the bottle. On June 5th, 1922, he said the word ‘dada’ when we gave him the stimulus word and held the bottle in front of him. The bottle was immediately given him. This procedure was repeated three times with success on that occasion – each time we gave the stimulus word. Then we took the bottle away five successive times and without our giving the stimulus word he said ‘dada’ for the bottle. At one of the trials he

kept on saying 'dada', 'dada', 'dada', several times without our giving the stimulus word. Thereafter for several weeks it was as easy to touch off this response as to call out any other bodily reflex. (ibid., 226)

Immediately apparent is that Watson considers there to be no qualitative difference between language and other forms of behaviour – all of which are considered conditioned responses:

...it is my belief that in the unlearned sounds made by the infant we have all the units of response which when brought together later (by conditioning) are the words of our dictionaries. Thus all the sounds that the distinguished, eloquent and facile lecturer makes in his impassioned address are but his unlearned infantile sounds put together by patient conditioning in infancy, childhood and youth. (ibid., 231)

Skinner's *Verbal Behaviour* (1957) accordingly analyses language into differing forms of conditioned responses: 'mands', i.e. verbal responses due to motivating operations (i.e. saying 'Water!' in response to a stimulus of thirst); 'echoic', i.e. a response based on the sound pattern of the stimulus (e.g. saying 'beaver' upon hearing another say 'beaver'); 'textual', where the stimulus is in the form of a text³¹; 'intraverbal behaviour', i.e. behaviour which exhibits no point-to-point correspondence with the verbal stimuli which evokes it (e.g. the response 'four' is not an imitation or replication of the stimulus 'what is two times two?'); 'tacts', i.e. behaviour which will occur with greater probability in the presence of given stimulus (e.g. saying 'whimsical' when feeling whimsical).

Grammar, on this account, is 'autoclitic' – that is, it modifies another type of verbal behaviour's function, e.g. saying 'I think it's raining' is a weaker assertion than saying 'it's raining', and the grammar performs the function of weakening the stronger assertion. Hence, Skinner characterises the sentences as the "larger segments of verbal behaviour resulting from autoclitic activity" (Skinner: 1957, 345) but does not consider the sentence anything more than this, writing that "we have no reason to use the notion of sentence to obtain a unit of verbal behaviour more active than word" (ibid., 345).

Since the cognitive revolution behaviourism has been marginalised, not least due to a series of devastating criticisms from Chomsky (see Chomsky: 1959 and 1971).³² However, as Tomasello notes (2003a, 82), associative theories of learning did not die with behaviourism.

³¹ Skinner includes the following under the term 'text': "A text may in the form of pictures (in so far as the response consists simply of emitting an appropriate vocal form for each picture), formalised pictographs, hieroglyphs, characters, or the letters or symbols of a phonetic alphabet" (Skinner: 1957, 65).

³² Some of these criticisms are outlined below; however I will not extensively reproduce all of Chomsky's arguments here. Instead I will focus on adapting Merleau-Ponty's critique of the constancy hypothesis to the sphere of linguistic experience (Chomsky's arguments being brought in where relevant).

Samuelson and Smith, for example, argue that the “contextual nature of memory and attention” (1998, 95), i.e. generalised processes, are sufficient to account for word acquisition. Their account avoids all reference to both speaker intentions and innate, lexicon-specific knowledge – indeed actively avoids any ascription of childrens’ word acquisition to “knowledge about language itself or about people’s goals in discourse” (ibid., 94).

In support of this theory, Samuelson and Smith reinterpret the results of an experiment by Akhtar, Carpenter, and Tomasello (1996). Akhtar et al. had a child and three adults – one parent and two experimenters – play with three objects, after which two of the adults – the parent and one experimenter (E2) – left the room. The remaining experimenter (E1) then produced a fourth object – the ‘target’ – which the experimenter and the child played with for a while. Following this, all the objects were put into a box and the parent returned with E2. When they re-entered the room, E2 exclaimed excitedly “Look, I see a gazzer! A gazzer! I see a gazzer in there!” and the parent added “Look, a gazzer! I see a gazzer!” (Akhtar et al.: 1996, 641) E2 then requested the child give them the gazzer, repeating the request if necessary but all the while maintaining eye contact with the child to avoid giving any clues. Children were able to retrieve the target object upon request to a statistically significant degree (ibid., 641).

Akhtar et al. interpreted these results as suggesting that “24-month-olds can use novelty to the discourse context *from the adult’s perspectives* as a cue in learning a novel object label” (ibid., 642). In other words, the children must have understood the new word via the adults’ intentional state. Samuelson and Smith, however, reinterpret these results as showing that word acquisition is an *associative* process, where the new word obtains its meaning by what is most contextually relevant at the time:

...the children in the study by Akhtar et al. mapped the novel word to the target because of the central role context plays in the general processes of memory and attention. Although children’s smart mapping of the word to target fits the communicative intent of the speaker, it need not be caused by an understanding of that intent. If this alternative account is right, then any manipulation that makes the target the most novel-in-context at the time of naming should cause children to map the novel word to the target object. (Samuelson and Smith: 1998, 97)

In support of this reinterpretation, they performed a similar experiment to that of Akhtar et al. but made the target object contextually novel by playing with it in a unique location relative to the three other objects (ibid., 97). Following this they returned to the original location and the children were shown all four objects in a box. The experimenter would then hold out the box to the child and say “There is a gazzer in here. There is a gazzer.

Look there is a gazzer. A gazzer. A gazzer is in here” (ibid., 97). As they were speaking, the experimenter ensured they maintained eye contact with the child so that the child could not use the experimenter’s gaze to discern what object ‘gazzer’ referred to. The child would then be asked to retrieve the gazzer (replicating the procedure of Akhtar et al.). The children were able to accomplish this (to a statistically significant degree) and Samuelson and Smith therefore took this to imply that the general processes of memory and attention are sufficient to explain word acquisition (ibid., 100).

In the discussion of associationist theories of language, the constancy hypothesis is most obviously present in the behaviourist variants: Both Watson’s and Skinner’s reductions of language to a set of responses assume that these behavioural responses are linked to given stimuli via operant conditioning. Grammar, as autoclitic, is simply verbal behaviour linked to given stimuli which serves to modify other verbal behaviour, i.e. grammar is simply a more complex form of verbal behaviour; the difference is one of degree, not of kind. Indeed, the constancy hypothesis is starkly illustrated in Skinner’s distinction between ‘tacts’ and ‘mands’ which share the same phonetic form, i.e. in distinguishing between saying ‘doll’ to ask for a doll (a mand) and saying ‘doll’ when referring to a doll (a tact). Skinner claims: “When the response *Doll!* Has been acquired as a mand, however, we do not expect that the child then spontaneously possesses a corresponding tact of similar form” (Skinner: 1957, 187). Therefore these two types of verbal behaviour must be accounted for *separately* if they are both found in a subject (ibid.). Accordingly, for behaviourism, we cannot explain the child’s behaviour as two uses of the same word due to the isomorphism between, on the one hand, ‘doll’ used as a mand to try and obtain the doll, and, on the other hand, ‘doll’ used as a tact to refer to a doll. This constancy hypothesis is also reflected in Watson’s remarks that “all the sounds that the distinguished, eloquent and facile lecturer makes in his impassioned address are but his unlearned infantile sounds put together by patient conditioning” (Watson: 1931, 231) – again, the advanced grammatical utterances are only more complex instances of verbal behaviour, and do not qualitatively differ from the sounds of an infant: Whilst the stimuli may overlap, the resulting verbal behaviour is nonetheless still a function of previous operant conditioning.

Importantly, the behaviourist position is not accurately characterised if a constant link is postulated between *meaning* and the phonetic form because, according to the behaviourist, it is impermissible to include ‘meaning’ in any scientific psychology: “The premises of the behaviourist contain no propositions about meaning. It is an historical word borrowed from philosophy and introspective psychology. It has no scientific connotation” (ibid., 249). Hence, on the behaviourist account, the constancy hypothesis manifests as the link between a given

stimulus and its correlated pattern of verbal behaviour. This relation between stimulus and verbal response is what could loosely be equated with 'meaning': *"If you are willing to agree that 'meaning' is just a way of saying that out of all the ways the individual has of reacting to this object, at any one time he reacts in one of these ways, then I find no quarrel with meaning"* (ibid., 250).

Behaviourism's account of language suffers similar problems to its account of perception. First, the account appears to be 'obscure' because it has no clear way of informing us what stimulus will cause a given verbal response, at best being able to identify a stimulus only *after* the response, and it is equally hard-pressed to give a coherent notion of a 'response' as a unit of verbal behaviour. Second, the behaviourist's account appears to be circular – either the behaviourist fails to account for the phenomena of language or they presuppose certain grammatical structures which are the very things their theory purports to explain.

Skinner considers a part of the environment a stimulus and a part of the behaviour a response if the former is lawfully related to the latter (established via a history of operant conditioning).³³ However, Chomsky points out that the device of associative conditioning is "as simple as it is empty" because we can only identify the stimulus *after* the response has been given (1959, 31-2). For example, a painting (the stimulus) might elicit a response such as "Dutch", or "Beautiful!", or "It's hanging lopsided", or "Remember our camping trip last summer?", or a variety of other utterances, and in each case the behaviourist would claim that the response is under the control of a given property of the given physical object, i.e. being painted by a Dutchman, being beautiful, being hung in a lopsided manner, having shared properties with a location where the subject went camping, and so forth. In consequence it seems that in any given situation we cannot know *which* of these properties is serving as a stimulus until the response has been given and, although we can account for a

³³ Chomsky (1959, 30) observes that Skinner is actually inconsistent on the question of whether *all* parts of an organism's environment may be called a stimulus (a broad definition) or only that part which the organism reacts to (a narrow definition). Conversely, Skinner is inconsistent as to whether everything the organism does is to be deemed the response (a broad definition), or simply that part of its behaviour which is lawfully related to the stimulus (a narrow definition). If 'stimulus' and 'response' are defined broadly then most of an organism's behaviour must be considered 'unlawful' and dependent on ill-defined factors such as attention, volition, or caprice – alternatively the behaviourist must simply admit that they have not demonstrated the vast majority of an organism's behaviour to be lawful. By contrast, if the narrow definitions are accepted then all behaviour is by definition lawful but only a very small portion of the organism's activity may be considered 'behaviour', which implies that the behaviourist must acknowledge their theory applies only to highly restricted areas (e.g. rats pressing levers). Chomsky points out that Skinner's inconsistency "creates the illusion of a rigorous scientific theory with a very broad scope, although in fact the terms used in the description of real-life and of laboratory behaviour may be mere homonyms, with at most a vague similarity of meaning" (1959, 30). Chomsky claims that with narrow definitions Skinner explains "almost no aspect of linguistic behaviour" and notes that with broad definitions "it is no more scientific than the traditional approaches to this subject matter" (ibid. 31). Here I will assume the more narrow definitions hold for the purposes of interpreting the behaviourist theory.

wide variety of responses in this manner, the behaviourist strategy seems hard pressed to account for verbal behaviour because its notion of a 'property' is, in this context, hopelessly obscure: "we can have as many [properties] as we have synonymous descriptive expressions in our language, whatever this means exactly" (ibid., 32).

More seriously, Chomsky notes this obscurity "disguises a complete retreat to mentalistic psychology" (ibid., 32). Presumably, in order to be able to determine which environmental property is the stimulus (in advance of the response) we require information about the subject in question so that we might ascertain which features will be a stimulus for them: "Stimuli are no longer part of the outside physical world; they are driven back into the organism" (ibid., 32). Just as the behaviourist account of perception is inadequate "because there is, in this mass of sensations... *nobody who sees*" (Merleau-Ponty: 2006, 25), so too is behaviourism's approach to language inadequate because there is nobody who speaks. Without this speaking subject it is difficult to make sense of the concept of 'stimulus', but this speaking subject is precisely what behaviourism methodologically excludes.

Not only is the behaviourist notion of the 'stimulus' obscure, but so is the behaviourist's notion of a 'response'. Skinner's definition of a unit of verbal behaviour – a 'verbal operant' – is "a responsible form functionally related to one or more independent variables" (1957, 20). Individuals have a 'verbal repertoire' in the sense that "responses of various forms appear in [their] behaviour from time to time in relation to identifiable conditions" and this repertoire therefore describes individuals' "*potential* behaviour" (ibid., 21). Although Skinner draws parallels between, first, 'words' and 'verbal operants' and, second, 'vocabulary' and 'verbal repertoire', he does not equate these terms. Whereas the traditional term 'vocabulary' denotes "a warehouse of inanimate tools" Skinner's term 'verbal repertoire' is intended be more dynamic, denoting "certain specific forms of verbal behaviour... observed under specific circumstances" (ibid., 22). Importantly, some verbal operants are more likely to occur than others.

Those verbal operants more likely to occur at a given time – those with a higher "probability of emission" – are said to have a higher "strength" (ibid., 22). The strength of a response is the basic datum of the behaviourist's analysis and may be determined by various measures: 'emission of response', i.e. emission of a verbal operant is in itself a sign of strength, and even more so if the situation is unusual (ibid.); 'energy level', i.e. the more stress and higher pitch, the greater the strength (ibid. 23); 'speed', i.e. the less hesitant and more rapid, the higher the utterance's strength (ibid. 24); repetition, i.e. the strength of a verbal operant may be increased via its repetition (ibid.); 'overall frequency', i.e. how frequently the verbal

operant occurs within an individual's repertoire (ibid. 27). Hence, Skinner writes: "If we are shown a prized work of art and exclaim *Beautiful!*, the speed and energy of the response will not be lost on the owner. We may accentuate the effect by using repetition: *Beautiful, beautiful, simply beautiful!*" However, says Chomsky:

It does not appear totally obvious that in this case the way to impress the owner is to shriek *Beautiful!* in a loud, high-pitched voice, repeatedly, and with no delay (high response strength). It may be equally effective to look at the picture silently (long delay), and then to murmur *Beautiful* in a soft, low-pitched voice (by definition, very low response strength). (Chomsky: 1959, 35)

Despite it being asserted by Skinner that the strength (i.e. probability of emission) of verbal operants (responses) is functionally controlled by stimulus, Chomsky's example serves to indicate that Skinner has not provided an adequate metric for response strength if his criteria (emission, energy, speed, repetition, and frequency) are to be taken literally and applying invariantly across all situations. However, if these proposed criteria are not taken literally, and are assumed to alter from situation to situation, then the behaviourist's account of response strength becomes so vague that it appears we no longer have an 'objective' metric to identify response strength, the basic data of the behaviourist's theory.

Worse, it remains unclear as to how the verbal operants, constituting the verbal repertoire, are actually to be *identified*. Skinner considers the traditional linguistic categories to lack "a sharp distinction between observed and inferred" (1957, 19), and points out that the word 'word' is used quite diversely in ordinary language, that people speak of the same word occurring in different languages, and that one language may require three words where another language needs only one. Skinner's verbal operants, defined in terms of their relation to independent variables in the environment (the stimulus), might therefore include units from different traditional categories:

Standard linguistic units are of various sizes. Below the level of the word lie roots and affixes or, more rigorously, the small 'meaningful' units called morphemes. Above the word come phrases, idioms, clauses, sentences, and so on. Any one of these may have functional unity as a verbal operant. A bit of behaviour as small as a single speech-sound... may be under control of a manipulable variable... On the other hand, a large segment of behaviour... may be shown to vary under a similarly unitary functional control. (ibid., 21)

Yet Skinner proposes no method, for any given instance of verbal behaviour, of determining what the controlling variables actually are, how many verbal operants have occurred, where the boundary of each operant is in the context of the total response, nor does Skinner give any criteria for establishing whether two instances of verbal behaviour may

be considered instances of the same verbal operant: “In short, no answers are suggested for the most elementary questions that must be asked of anyone proposing a method for description of behaviour” (Chomsky: 1959, 33). Given that Skinner’s account seems to lack the apparatus to identify a unit of verbal behaviour, the behaviourist account of language, like its account of perception, seems hard-pressed to account for how complex, unified, meaningful, linguistic expressions may develop from exposure to a series of discrete stimuli.

Just as the behaviourist’s account of perception is obscure for failing to specify what features and powers must be associated for a unified object to be given in perception, so too does the behaviourist account of language appear obscure. Behaviourism neither adequately specifies what features or properties determine the production of a given unit of verbal behaviour nor does it provide an account of what a unit of verbal behaviour actually is – it only asserts that such responses are conditioned and controlled by their respective stimuli. However, the question of how verbal operants might be identified also reveals that not only might the behaviourist theory be obscure, it also appears to be circular. To illustrate this, consider the following pair of examples (taken from Chomsky: 1986, 8):

I wonder who [the men expected to see them]
[The men expected to see them]

The bracketed phrase occurs in each of the two examples. Yet the word ‘them’ refers to the men in the first example, whereas in the second example it refers to a different unspecified group of people (or objects). A major weakness of the behaviourist account is that it is difficult to see how a behaviourist would even *formulate* such a problem given that ‘meaning’ is held to be a pre-scientific concept. The behaviourist might assert that there simply is no problem because the instances of ‘them’ or ‘the men expected to see them’ in each example are *different* verbal operants under the control of different stimuli. If this approach is taken then the constant relation between stimulus and response is preserved, but the behaviourist seems to either ignore the phenomena of language or must actually produce an account of *what features of the stimuli* allow these two verbal operants, sharing the same form, to be individuated. Alternatively, the behaviourist might acknowledge this to be a legitimate problem and face the challenge of accounting for how the word ‘them’ alters its meaning. Since grammar is maintained to be ‘autoclitic’, modifying other verbal operants, it might be asserted that ‘I wonder who...’ performs the required modification.³⁴ In this case, instead of different instances of ‘them’ being different verbal operants the behaviourist maintains there to be a single verbal operant modified via another verbal operant. However

³⁴ Again, this solution is highly implausible given the behaviourist’s view of meaning.

this seems incorrect as it would in turn raise the question of why 'I wonder who...' does not alter the meaning of the last word in 'the men expected to see Jill'. It seems odd to respond that there are two verbal operants at work here, both with the form 'I wonder who' and only one of which performs the modification, because then we return to the problem of individuating the stimuli correlated with each response (or, alternatively, simply ignoring the linguistic phenomena).

Just as Merleau-Ponty charged the behaviourist's account of perception with circularity due to the presupposition of perceptual unity, it seems possible to make an analogous charge regarding the behaviourist account of language. From the point of view of our own experience, we are able to understand immediately what 'them' refers to in each of the examples (the men in the first case, and unknown persons/objects in the second), and we are able to use 'them' in these two ways without problem. However, if it is acknowledged that the meaning of 'them' alters depending on the grammatical structure within which it occurs, then it seems that understanding the meaning of this word *presupposes* an understanding of grammatical relations, as it is only in virtue of such relations that we may understand what part of the world the word refers to at any given time.

The treatment of grammar as simply 'autoclitic', as in principle no different from more basic units of verbal behaviour, appears to constitute a major weakness in the behaviourist's account. Returning to the experiment conducted by Watson (training the infant to emit the sound 'dada'), the infant's sounds appear to be, at best, more akin to holophrases (symbols functioning as an entire phrase) as opposed to an actual word. Linguistic experience, however, simply does *not* consist of a collection of holophrases, but grammatically structured forms of meaning. Equally, Skinner's distinction between tacts and mands, and his assertion that tacts and mands sharing the same external sound-pattern must be accounted for separately, also seems to overlook that a word can in fact function referentially or declaratively, as a 'tact', or imperatively, a 'mand' – we may use a noun such as 'Facebook' as a verb, as when we 'facebook them' which is immediately understood and does not seem to require a period of operant conditioning. Yet the behaviourist appears incapable of explaining such observations. Extending this, it seems like the behaviourist's exclusion of meaning from psychology prevents them from understanding the phenomenon of linguistic experience.

The associative theory of Samuelson and Smith also encounters similar problems which Tomasello identifies when he writes:

...the theory does not even acknowledge that linguistic symbols are special.
The theory implicitly holds that a linguistic symbol is simply a sound (or

possibly a hand-sign) that 'stands for' something in the real world. What it means for one thing to stand for another is never really addressed. (Tomasello: 2003a, 84)

This becomes an acute problem when grammar is considered. Claiming that symbols are associated with what is contextually relevant ignores subtle distinctions in meaning that occur with different grammatical structures. Hinzen and Sheehan (forthcoming, 119) argue that grammar performs a kind of 'topological mapping' – consider the following examples (from *ibid.* 120-1):

- (1) [Man] arrived
- (2) John likes [a man]
- (3) John likes [men]
- (4) John is looking for [three men]
- (5) John is looking for [the three men]

In each case the meaning of the word 'man' appears to be altered. (1) implies that the *species* man evolved. (2) holds a less abstract meaning, indicating that John likes a particular *individual* man. (3) indicated that John likes a class of things, individual men, though no particular individuals are being referred to. (4) is, like (3), generic but now the interpretation is that John is looking for a group of three men, though no particular three men are being indicated. (5) removes the generic interpretation, and implies that now it is three particular men that John is looking for.

Presumably, then, if an associationist theory is to account for language it must account for how the same word may form itself to these different entities in these different ways. However, despite Samuelson and Smith's claim that words may be learned via association, it is unclear what associations would produce the varieties of meaning, correlated to grammatical structure, identified by Hinzen and Sheehan. After all, we do not experience 'man' in the abstract, despite (1) being the simplest grammatical structure. Rather than associations explaining different 'topological mappings', it seems that associating the word with the relevant part of the world *presupposes* the ability to perform such topological mappings. For these reasons, it seems that, like the behaviourist account, Samuelson and Smith's associationist theory is both obscure and circular.

2.2 Intellectualism

Whereas the empiricist approach attempts to account for perception via the association of sensations, the 'intellectualist' approach considers perception to be organised via acts of judgement; the mind *imposes* structure on the 'raw' data given in sensation and, via these structures, experience and/or cognition is made possible. In his critique of

intellectualism, Merleau-Ponty first discusses 'attention', i.e. scrutiny of the data given in sensation, and then discusses 'judgement', i.e. mental acts which structure experience: "Judgement is... introduced as *what sensation lacks to make perception possible*" (Merleau-Ponty: 2006, 37). Since the account of linguistic experience I discuss in this section is very much a cognitivist one, I will briefly outline Merleau-Ponty's critique of attention before giving a more detailed overview of his discussion of judgement, after which I will discuss Jackendoff's account in light of Merleau-Ponty's criticisms.

For Descartes, perceptual error is a matter of being inadequately attentive, i.e. inadequately *scrutinising* our sensations, as opposed to being a problem with the sensory data itself. As Merleau-Ponty summarises it:

The moon on the horizon is not, and is not seen to be, bigger than at its zenith: if we look at it attentively, for example through a cardboard tube or a telescope, we see that its apparent diameter remains constant. Inattentive perception contains nothing more and indeed nothing other than the attentive kind. (ibid., 32)

If the source of perceptual error is 'inattentiveness' then, like empiricism, intellectualism supposes that prior to 'attention' is a level of sensations linked isomorphically to objects: "The trouble with intellectualism is that it shares too much with the very empiricism that it claims to oppose" (Matthews: 2006, 32). Merleau-Ponty therefore characterises this 'attending' as an "abstract and ineffective power" precisely because it does not actively structure our experience but rather 'shines a spot-light' on sensations which are already fully-formed: "We are not called upon to analyse the act of attention as a passage from perceptual indistinctness to clarity, because the indistinctness is not there" (Merleau-Ponty: 2006, 32). 'Attention', then, does not seem adequate to explain a transition from sensation to perceptual clarity because there is no confusion in sensation to begin with (Carman: 2008, 54).

That *judgement* is essential to make perception possible is often taken to be true precisely because the intellectualist shares with the empiricist a common notion of 'sensation'. Descartes, for example, emphasised that when we look down at a street and perceive people walking all that we really *see* are hats and coats. Therefore, we require a mental act of judgement that these are, in fact, people that we are observing – consequently, Descartes maintained that "it is my mind alone which perceives" (1997, 144). According to the intellectualist, then, perception *is* cognition: "even bodies are not properly speaking known by the senses... but by the understanding only, and since they are not known from the fact that they are seen or touched, but only because they are understood" (ibid., 144). As Merleau-

Ponty puts it, intellectualism “thrives on the refutation of empiricism” (Merleau-Ponty: 2006, 37). Intellectualism adopts the strategy of accepting the empiricist concept of sensation, demonstrating that the perceptual object has “properties which it does not possess on my retina”, then concluding from this that judgement is required to account for perception (ibid., 38). In the case of Descartes, there is an assumed constancy between the hats and coats and our impressions of them; an act of judgement is required to move from hats and coats to *people*. Merleau-Ponty also gave the example of the Necker cube, a structure which can be viewed in two ways – yet, despite knowing this, we are unable to simply ‘flip’ the cube at will. Rather, “my knowledge must await its intuitive realisation” (ibid., 40). Approaching this phenomenologically, we would say that this is not simply a judgement, for we cannot simply judge that the cube is one way or another. However, if the empiricist definition of sensation is adopted then we are inevitably led to conclude that judgement is the cause of the illusion because the underlying sensations are assumed to be constant.

Carman (2006; 2008) notes that a contemporary proponent of this intellectualism is Dennett, who removes the question of the relation between experience and judgement by explicitly rejecting *any* possibility of perception prior to judgement. To those who believe there can be such pre-conceptual experience, Dennett says:

You’ve fallen in a trap... You seem to think there’s a difference between thinking (judging, deciding, being of the heartfelt opinion that) something seems pink to you and something *really seeming* pink to you. But there is no difference. There is no such phenomenon as really seeming – over and above the phenomenon of judging in one way or another that something is the case. (Dennett: 1993, 364)

Thus, for Dennett, perception is ‘cognition all the way down’ – every experience “is literally a kind of judgement or supposition that something is the case” (Carmen: 2006, 60). Having an experience is therefore identical to having a belief, and Dennett “brusquely denies the possibility in principle of consciousness of a stimulus in the absence of the subject’s belief in that consciousness” (Dennett: 1993, 132). Our ordinary experience, however, *does* distinguish between sensation and judgement, though intellectualism’s reduction of experience to judgement ignores the phenomena in question. As Merleau-Ponty puts it:

Ordinary experience draws a clear distinction between sense experience and judgement. It sees judgement as the taking of a stand, as an effort to know something which shall be valid for myself every moment of my life, and equally for other actual or potential minds; sense experience, on the contrary, is taking appearance at face value, without trying to possess it and learn its truth. The distinction disappears in intellectualism, because judgement is everywhere

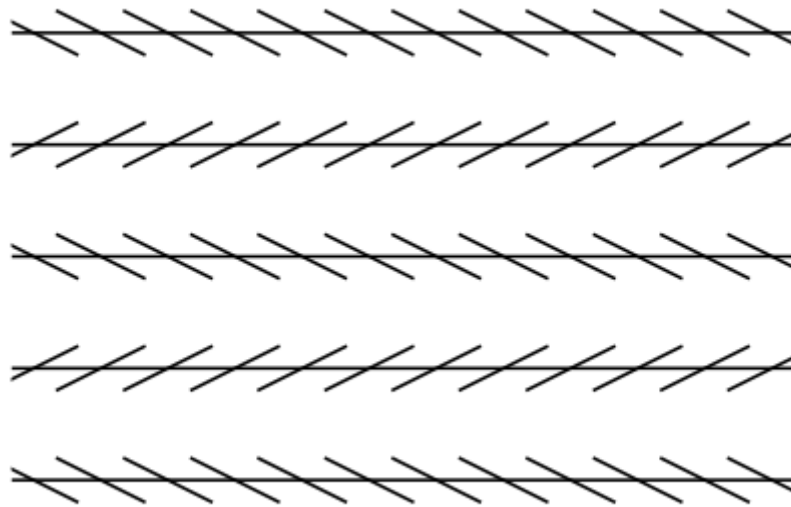
where pure sensation is not – that is, absolutely everywhere. The evidence of the phenomena will therefore everywhere be challenged. (Merleau-Ponty: 2006, 39)³⁵

As Merleau-Ponty understood, Dennett is forced to challenge the evidence of our experience: “*There seems to be phenomenology...* But it does not follow from this undeniable, universally attested fact that *there really is phenomenology*” (Dennett: 1993, 366). Granted, Dennett is no doubt using ‘judgement’ in a technical sense, divorced from everyday usage, but it nevertheless seems to beg an important question. To illustrate this, take Zöllner’s illusion: the horizontal lines seem to converge despite being parallel and *despite us knowing they are parallel*. Intellectualism attributes this to error in judgement. However, Merleau-Ponty states:

My mistake apparently remains unexplained. The question ought to arise: How does it come about that it is so difficult in Zöllner's illusion to compare in isolation the very lines that have to be compared according to the task set? Why do they thus refuse to be separated from the auxiliary lines? (Merleau-Ponty: 2006, 41)

If a technical definition of ‘judgement’ is adopted whereby judgements are “any perception of a relationship” then Merleau-Ponty acknowledges that the illusion is a judgement. But, he qualifies, this sort of analyses “presupposes... a layer of impressions [i.e. sensations] in which the main lines are parallel” and then a “second order operation which changes the impressions by bringing in auxiliary lines, thus distorting the relationships of the principal lines” (ibid., 41). This leads to the odd conclusion: “We construct the illusion [via judgement], but do not understand it” (ibid., 41).

³⁵ Carmen writes: “One could almost believe Merleau-Ponty had Dennett in mind when he wrote those words” (2006, 62).



What intellectualism seems strained to answer is the question of why the lines in Zöllner's illusion are judged falsely but a set of parallel lines (in isolation) is not. Obviously the auxiliary lines somehow 'break up' the parallelism. This forces us to locate the source of this illusion at a (pre-predicative) perceptual level, not at the level of judgement, for judgement seems only to explain perception "when it is guided by the spontaneous organisation and the special mode of arrangement of the phenomena" (ibid., 41). Intellectualism, then, begs the following questions: At what are the operations of the intellect directed? How do our minds orient themselves at the outset vis-à-vis their objects? (Carmen: 2006, 64) Attempting to answer such questions by advocating 'judgement all the way down' is to enter into an infinite regress where these same questions will arise again with each new layer of judgement that is postulated.

In summary, intellectualism cannot acknowledge pre-predicative experience if it reduces all experience to judgement. Consequently, it seems to mischaracterise the phenomenology of perception as it cannot admit a distinction between the way something seems to us and the way we *think* that it seems – yet Zöllner's illusion provides an instance where the horizontal lines appear to converge, despite that we can judge them to be horizontal. Our experience, then, speaks against the radical reduction of perception to judgement (in the ordinary sense of judgement). Further, intellectualism appears incapable of accounting for such a visual illusion for it is required to make reference to a prior perceptual whole, which is precisely what remains (seemingly) inaccessible if perception is to be considered 'judgement all the way down'. "The result" says Merleau-Ponty "is that intellectualist analysis eventually makes nonsense of the perceptual phenomena which it is

designed to elucidate” (Merleau-Ponty: 2006, 39). Merleau-Ponty’s critique has, at its heart, a rejection of the constancy hypothesis – intellectualism essentially shares an (hidden) assumption with empiricism, i.e. that sensation is isomorphic to the object sensed. Intellectualism therefore considers judgement, as opposed to perception itself, the source of perceptual error as, if such an isomorphism holds, perceptual error cannot arise at the sensory level.

The intellectualist’s constancy hypothesis and the corresponding phenomenological critique also seem to apply to Jackendoff’s account of linguistic experience, which strictly delineates phonology, syntax, and semantics. Jackendoff has developed an ‘intermediate-level’ theory of consciousness, and has extended it to the phenomenology of language. Briefly, Jackendoff proposes consciousness to be an ‘intermediate-level’ between, on the one hand, mental representations of objects and, on the other hand, the realm of ‘pure’, functional thought – we are conscious neither of external things nor the pure realm of thought. When Jackendoff turns to language, he is searching for the ‘functional correlates of consciousness’. He advances the following hypothesis: “When one is experiencing language, the forms in awareness... most closely mirror phonological structure” (Jackendoff: 2007, 80).³⁶ Jackendoff gives the following evidence for the claim (ibid. 81): we experience language as perceived sound; we can intuitively divide speech streams into words, syllables, and (with training) individual phonetic features; we can identify stress patterns relatively well intuitively.³⁷ Indeed, Jackendoff explicitly denies the presence of syntax and semantics in the phenomenology, pointing out that you have to take a course in grammar to be able to identify syntactic categories (and even then there exists substantial disagreement amongst linguists over *what* syntactic categories there actually are), and that people have “have no intuitions at all about the form in which meaning is encoded” (ibid., 81).

Going into more detail, Jackendoff asks us to consider a case of hearing a string of nonsense syllables, e.g. ‘ishkaploople pukapi datofendle’, or alternatively words spoken in a language you don’t understand (ibid., 81). In this case, the phonology is sufficient for

³⁶ In this regard, Jackendoff’s theory appears similar to Dennett’s, who has written: “There is no reality of conscious experience independent of the effects of various vehicles of content on subsequent action (and hence, of course, on memory)” (Dennett: 1993, 132). Jackendoff might also be sympathetic to Dennett’s ‘multiple drafts’ model of consciousness (see Dennett: 1993, 101-38), which he briefly references when discussing the ‘promiscuity’ of language processing, i.e. that the processor “constructs *all* reasonable possibilities and runs them in parallel, eventually selecting a single most plausible or most stable structure as more constraints become available, and inhibiting the other structures” (Jackendoff: 2007, 20). I will not discuss the compatibility of the two thinkers’ positions here, instead confining myself to the phenomenology and the constancy hypothesis.

³⁷ One important qualification is, however, that whilst Jackendoff believes experience of language to be experience of phonological forms, he does *not* believe that all levels of phonological structure are present in the phenomenology.

awareness, but meaning is not. Jackendoff acknowledges that there is a qualitative difference between a meaningless string and a meaningful one, but nonetheless claims that this is because “a sentence that one understands conjures up associated images, linguistic and non-linguistic, via its meaning” (ibid., 81). Nonetheless, such images, thinks Jackendoff, say nothing about the form of the meaning (ibid., 82).

Another case Jackendoff draws upon is the ‘tip-of-the-tongue’ phenomenon, described by Chomsky as follows:

...what seems obvious to me by introspection is that I can think without language. In fact, very often, I seem to be thinking and find it hard to articulate what I am thinking. It is a common experience for me and I suppose for everybody to try to express something, to say it and to realise that it is not what I meant and then to try to say it some other way and maybe come closer to what you meant; then somebody helps you out and you say it in yet another way. (Chomsky: 2009b, 76)

The conclusion drawn by Chomsky is that “it is fairly hard to make sense of that experience without assuming that you think without language” (ibid., 76). So too Jackendoff points to the “yawning gap waiting to be filled” and claims that “meaning without phonology leads to an absence of the qualia that give experience a form – or perhaps there is a quale of absence or formlessness” (Jackendoff: 2007, 82).

From these considerations, Jackendoff concludes: “...phonology is necessary and sufficient for the presence of linguistic qualia, and meaning is neither necessary nor sufficient” (ibid., 82). This leads Jackendoff to three subsequent hypotheses. First, we can only know the content of our thought in virtue of the phonology. Jackendoff notes that this extends to speakers of sign-language who experience their thought in visual or proprioceptive ‘images’ of hand movement (ibid., 83). Second, the form of thought is never given in consciousness, but if converted into linguistic form, the linguistic form can serve as an object of consciousness (ibid.). Therefore we linguistic creatures are capable of an awareness of our thoughts which those without language are not (ibid., 87). Third, such phonetic forms “provide most of the evidence that we are thinking” (ibid., 84). In other words, the functional correlates of consciousness are (in the case of language) phonological forms (ibid., 85).

Therefore, Jackendoff “strongly dissociates consciousness from thought, while at the same time accounting for the intuition that we experience ourselves thinking in a language” (ibid., 84). This is not to say that Jackendoff believes that language has no implications for our mental capabilities. Whilst Jackendoff (1996) maintains the Cartesian view that thought “is a mental function completely separate from language and can go on in the absence of language”, he nonetheless considers that language, by giving thought phonological form,

provides a “scaffold” by which we can think about our own thoughts (ibid., 2). Language achieves this, according to Jackendoff, in three ways. First, it acts a ‘cultural repository’ of ideas (Jackendoff acknowledges that this claim is unoriginal). Second, when our ideas are translated into linguistic form, they become an object for attention to focus on which makes perceptible otherwise non-perceptible aspects of thought such as predication/relational forms or abstract elements. As Jackendoff puts it:

A non-linguistic organism can obviously detect patterns of light and darkness, and respond to diurnal patterns. But it takes the word *day* to abstract this object out as a sort of object, so that attention can be drawn to it as *a sort of constancy*. The word is a perceptual object that anchors on the pattern and allows it to be stored as a repeatable and retrievable unit in memory. (Jackendoff: 1996, 24, *italics mine*)

Third, Jackendoff believes language to be “the only modality of consciousness valuations of percepts to awareness as independent elements” (Jackendoff: 1996, 28). Expanding, our everyday experience contains ‘valuations’ (e.g. ‘certainty’, meaning, etc.) and these valuations are binary (i.e. ‘certainty/uncertainty’, ‘meaningful/meaningless’, etc.), such that the difference between a given sound heard as a meaningful linguistic utterance and the same sound heard as meaningless noise is the valuation [+meaningful] or [-meaningful] assigned by mental operations to the perceived perceptual data. Indeed, whilst it is possible for some utterances to be completely meaningful and others to be completely meaningless, it is also possible to have an utterance which is meaningless as a whole, but whose individual words are meaningful (Jackendoff: 2007, 93):

The little star’s beside a big star	[+ meaningful]
Ishkaploople pukapi datofendle	[-meaningful]
Colourless green ideas sleep furiously	[-meaningful], but individual words are
	[+meaningful]

Additional support for the presence of such valuations comes, thinks Jackendoff, from considering cases such as learning to see something as meaningful, or the experiences of schizophrenics or drug users who report everything as meaningful (ibid., 94). In the former case, the object or perceptual data does not change when “a pattern of splotches [changes] into a picture of a Dalmatian” (ibid.). In the latter, the object and the perceptual data it yields remain the same for everyone. But for the schizophrenic or drug user “the whole world is full of wonderful patterns and meanings that no-one else can appreciate” (ibid.). Equally, the ‘tip-of-the-tongue’ phenomenon (see above) can be characterised as meaningful, despite having no content features (ibid.). In the first case, claims Jackendoff, it must be mental operations

that assign [+meaningful] because nothing in the perceptual data (i.e. the qualia) was modified. In the second case, mental operations must mistakenly judge [+meaningful] for nothing in the perceptual data (i.e. the qualia) warrants this judgement; in the tip-of-the-tongue phenomenon, the mind has assigned the valuation [+meaningful] but the difficulty lies in articulating this meaning. Returning to the relation between language and thought then, language enables us to name these valuations, allowing them to become objects of our attention – thus allowing a recursive structure of [thought about [thought about [thought....]]].

Language, then, can enhance thought, but only as the result of encoding thought as a perceptual object. It is these phonological percepts, whether they are generated by the speaking or listening subject, which are necessary for linguistic experience. Although grammatical structure serves to make this encoding possible, it remains *expressive* as opposed to *constitutive* of thought. Jackendoff maintains a strict separation between syntax and semantics, claiming that “semantics is a combinatorial system independent of, and far richer than, syntactic structure” (Jackendoff: 2003, 123). Further, Jackendoff aims “to evacuate all semantic content from syntactic structure” (ibid.). Syntax, for Jackendoff, is linguistic, dealing with issues such as pluralising a noun to agree with number, or ensuring the correct case ending (in languages where this is a concern). Semantics, by contrast, deals with “conceptual structure” which, Jackendoff believes, “is not part of language per se – it is part of thought” and is responsible for utterances being understood in context, incorporating all pragmatics and ‘world-knowledge’, as well as being the structure in terms of which we reason and plan (ibid.).

Words, on Jackendoff’s account, “belong to syntactic categories” and Jackendoff believes that this “must be reflected somehow in neural instantiation” (ibid., 24). He *does* acknowledge that, although the traditional syntactic categories are discrete, “neural computation appears to be somewhat graded, a matter of degree of activation or synaptic strength” and that this “forces us to recognise that the dimensions of linguistic state-space [in the brain] are to some degree continuous rather than digital” (ibid. 25). Nonetheless, it appears to be the case that, for Jackendoff, the structure of lexical items includes features which constrain how they may be used grammatically – for example, the *transitive* feature is carried by verbs (ibid. 52).³⁸

³⁸ The transitive feature is an instance of a subcategorisation feature, which is a kind of *constraint*, i.e. the presence of the feature is postulated in order to *prevent* certain grammatical operations from occurring – in this case, using an intransitive verb in a transitive expression. In the following chapter I will discuss generative linguistics and define the items of technical vocabulary, such as ‘constraint’ and ‘subcategorisation feature’, more thoroughly.

The linguistic constancy hypothesis is therefore operating within this intellectualist account: the content of our linguistic experience is phonological qualia, generated from sensory 'inputs'; phonological qualia are perceived as meaningful only insofar as the mind judges them to be; the mind imposes syntactic and semantic structure on phonological qualia when linguistic experience is [+meaningful]. In what follows I will argue that linguistic experience does not support such a clear division between phonology, syntax, and semantics: with regard to syntax and semantics, I will cite some examples which seem to indicate that grammar plays a role in constituting meaning; regarding the phonology, I will draw upon 'click' experiments from psycholinguistics to suggest that grammatical structure appears constitutive of linguistic experience.

Before launching into a phenomenological critique of Jackendoff's position, it is worth emphasising that the presuppositions of this thesis run directly contrary to Jackendoff's own. Qualia, for example, appear essential to Jackendoff's analysis – yet this is precisely the type of philosophy of mind which the phenomenological tradition has tended to reject. Linguistic experience consists of meaningful expressions, not brute phonetic forms. Indeed, the perceived meaning might 'mask' the qualia. Consider, for example, the classic Stroop test where colour-words (e.g. 'red', 'black', 'blue', etc.) are shown printed in coloured ink, where the colour denoted by the word does not necessarily correspond to the colour of the ink. One question addressed by Stroop's experiments was: "What effect would practice in reacting to the colour stimuli in the presence of conflicting word stimuli have upon the [subject's] reaction times...?" (1935, 646) Stroop's experiments, replicated hundreds of times since, reveal a substantial effect: When the colour denoted by the word differed from the colour of the ink used to print the word, the time taken for subjects to name the colour of the ink increased by 74.3 per cent. By contrast, when subjects were simply required to read the word, not just name the colour of the ink, the delay was only 5.6 per cent (ibid., 659). The stark contrast clearly illustrates the immediacy of linguistic meaning in our everyday experience. The force of the linguistic meaning is so great that it is noticeably more difficult to say the ink's colour when the word names a different colour (reflected in the 74.3 per cent average delay), whereas it is easy to read the word when it names the colour of its own ink (reflected in the 5.6 per cent average delay). Hence, the same general criticisms advanced by phenomenologists seem to apply also to Jackendoff's phenomenology of language – the Stroop test seems to provide a vivid illustration that in linguistic experience as much as perception, it is not 'qualia' but meaning that is primary.

It also seems that an analysis of linguistic experience might dissolve Jackendoff's strict distinctions between phonology, syntax, and semantics. Jackendoff's example of perceiving words in a foreign language or nonsensical strings of syllables might have 'stacked the deck'. It is true that "ishkaploople pukapi datofendle" is basically meaningless, and it is also true that we may be aware of those nonsense syllables as they are sounded. *But*, it also seems to be the case that grammar is completely absent in this example. There are two points which might be made here: first, against a rigid separation of syntax and semantics, nonsense may acquire a sort of meaning if suitably grammaticalised; second, against a rigid separation of phonology from syntax, grammatical structure appears to affect how brute 'acoustic material' is perceived.

Regarding the first point, Lewis Carroll's famous poem illustrates the kind of meaning grammatical structure can bestow:

T'was brillig, and the slithy toves,
Did gyre and gimble in the wabe;
All mimsy were the borogoves,
And the mome raths outgrabe.

As Alice said: "Somehow it seems to fill my head with ideas – only I don't exactly know what they are!" (quoted in Pinker: 1995, 89) Carroll's nonsense is of a different sort than Jackendoff's: Jackendoff's example contains no clue as to how the syllables are grammatically organised, hence to what parts of speech they ultimately belong; by contrast Carroll's words *are* grammatically organised and we are consequently able to tell that 'borogoves' are things and that these things were 'mimsy'. Of course, *exactly* what these words mean is very unclear, but we seem to have some notion of them that gives Carroll's nonsense an odd kind of meaning. What sort of meaning this is will be discussed below in the sixth chapter ('The Schematism') but for now we should note that, unlike Jackendoff's example, Carroll's poem is not completely meaningless despite lexemes like 'mimsy' or 'borogove' being nonce words. Rather, linguistic experience seems to involve grammatical structures which 'shape' words such that we understand that they are things or actions, and that we understand – in a limited sense – what sort of things or actions they are.

To further emphasise this point, recall the following set (1-5) of examples of the use of the word 'man' (from Hinzen and Sheehan: forthcoming). 'Man' can refer to a species, an individual, a class, etc., and, importantly, the *sort of thing* that 'man' is taken to be appears to co-vary with the grammar. Also, consider the following sets of examples (adapted from Kaschak and Glenberg: 2000):

Art sneezed
Art sneezed the foam off the beer

The chair
Rachael chaired the scientist the mail

In the first pair of examples, the verb 'sneeze' is used normally in the first expression, i.e. intransitively. However, in the second example 'sneeze' is used transitively. In the second set, the word 'chair' is used as a noun in the first expression whereas it is a transitive verb in the second. As Kaschak and Glenberg (2000) demonstrated, subjects have no difficulty interpreting the sentence to mean that Rachael placed the mail on the chair and pushed the chair to the scientist (especially when the surrounding linguistic expressions frame the utterance such that the subject knows what Rachael is intending to take the scientist the mail, and that the chair has wheels). Recall that, for Jackendoff, words carry features which constrain their use – an intransitive verb, being assigned the feature [-transitive], should be ungrammatical if used transitively. Similarly, lexical items carry features like noun and verb, and one may not simply be inserted into a place reserved for the other. As Jackendoff himself puts it, what all nouns have in common is

...not their semantics but their ability to occur in noun positions in relation to verbs and prepositions, their ability to govern number/gender agreement and take case endings (in languages that have such functions), their ability to occur with certain kinds of quantificational expressions such as *many*, *much*, and so forth – all syntactic properties. (Jackendoff: 2003, 125)

However these appear to be cases where it is acceptable to violate these constraints. In the face of such examples it seems that we must either abandon the assumption that words are linked via features to meanings or we must postulate that whenever a word occurs which appears to be conflict with its features then it is a *different* word. If the latter option is chosen then in the first set of examples there are two verbs, an 'intransitive sneeze' and a 'transitive sneeze', and in the second pair there is a noun and a verb both sharing a common acoustic structure.

These examples, then, are not a 'knock-down' argument against Jackendoff's 'parallel architecture' because they do not *definitively* illustrate the need to dissolve the syntax/semantics divide – Jackendoff can simply assert that with every such example a new word has been acquired by the subject, or a different word has been recalled. However, despite the need for a dissolution of the syntax/semantics divide not clear cut, it still seems to be a fairly powerful argument on grounds of simplicity: the theory requires more and more

lexical items be introduced in order to cope with every instance where actual word-use conflicts with the postulated features of those particular lexical items – the size of our required lexicon would therefore massively balloon. By contrast, in this thesis I wish to account for these sorts of examples by assuming that grammar itself ‘shapes’ the words into a manner that can ‘fit’ certain situations, i.e. that grammar is ‘prior to pragmatics’. How this is to be achieved will be the discussion of chapter 6 (‘The Schematism’), however for now I will assume that it is perhaps inaccurate to consider words correspond to meanings in virtue of constant feature sets, and therefore that it might be overly simplistic to maintain a tripartite distinction between the [+meaningful] expressions, [-meaningful] expressions, and expressions which are [-meaningful] but whose words are [+meaningful].

Second, and more importantly for Jackendoff’s phenomenological claims, grammatical structure *does* seem to affect linguistic experience, implying that the distinction between phonology and grammar might be blurred. Numerous experiments in psycholinguistics adopted the technique of having subjects listen to utterances during which they would also hear a click. Subjects were then tasked with identifying *where* the click occurred in the utterance (for overviews see Fillenbaum: 1971, 286-7 and Johnson-Laird: 1974, 136-7). Such click experiments exploit “the tendency of a perceptual unit to preserve its integrity by resisting interruptions” (Fodor and Bever: 1965, 415), and the experimenters indeed found that clicks tended were displaced to gaps between clausal units. As Fodor and Bever put it, “the segments marked by formal constituent structure analysis in fact function as perceptual units and... the click displacement is an effect which insures the integrity of these units” (ibid., 414). This effect was not due to the effects of factors such as intonation, rhythm, stress – factors pertaining to the ‘acoustic material’. An experiment by Garrett et al. (1966) used pairs of sentences which had some set of lexical items in common but whose structural break occurred at a different point within those shared lexical items. For example:

- A. (In her hope of marrying) (Anna was surely impractical)
- B. (Your hope of marrying Anna) (was surely impractical)

The experimenters ensured that there were no clues as to the location of the break in the ‘acoustic material’ itself by making the common portions of the sentences “acoustically identical”: “For example in the above sentence, the portion *...hope of marrying Anna was surely impractical* taken from the recording of A was spliced to the portion *Your...* taken from B” (Garrett et al.: 1966, 30). Once again, despite the common acoustic material, subjects located the clicks not where they actually occurred but where there was a break in the grammatical structure. Interestingly, further experiments by Bever et al. (1969) found that

clicks were displaced *only* to breaks between two clauses – clicks were *not* displaced to structural breaks ‘lower’ than the clausal level, and this displacement occurred even where the explicit phonological structure of the utterance gave no obvious indication of where the break occurred (ibid.).

These experiments would seem to imply that it might be inaccurate to claim that linguistic experience consists of phonological qualia with signification thrown over them. That clicks were displaced to clausal boundaries, as opposed to more minor breaks, and that this effect reliably occurred with identical ‘acoustic material’ seems to indicate the presence of grammar in linguistic experience. A further piece of evidence from psycholinguistics to this effect might be speech compression in normal conversation, which can be observed by extracting words from the flow of normal discourse.³⁹ In isolation the extracted words appear incomprehensible. However, within the actual utterance we understand them. The obvious question, if phonology is necessary and sufficient for linguistic experience, is why extracted words are incomprehensible in isolation but meaningful when part of an utterance. If the underling ‘percept’ has not changed, presumably a phonological judgement would still be possible. However this does not appear to be the case. Instead, hearing ‘correctly’ only seems possible when the phoneme occurs within an utterance – and since utterances are grammatically structured, it seems that grammar, as linguistic form, is an inextricable part of linguistic experience.

Taken together, the click experiments, instances of speech compression, and the Stroop test seem to support the view that we perceive meaningful units, not simply units of phonological qualia that may then be judged as meaningful or not in virtue of being linked to feature-sets. Just as the intellectualist approach to perception assumes a constancy hypothesis, so too does Jackendoff’s account of linguistic experience assume a constant relation of meaning to given phonological qualia. However, in maintaining phonology to be both necessary and sufficient for linguistic experience, Jackendoff seems to overlook that linguistic experience is experience of whole expressions. The phenomenon of click displacement shows that an interrupting click will be displaced toward the clausal boundary despite identical ‘acoustic material’ – that grammatical structure is present in linguistic experience. Speech compression reveals that entire words cannot be understood if they occur apart from the wide grammatical whole – analogous to the intellectualist’s account of perception, Jackendoff’s account of linguistic experience seems to beg the question of what the operations of the intellect are targeted at. Additionally, that we seem capable of

³⁹ Bever has presented these instances of speech compression, collected by Natasha Warner and Ben Tucker, during a recent MIT linguistics symposium: <http://www.youtube.com/watch?v=PAUgyyKs6zU&feature=plcp>

understanding phrases like ‘chair the mail to the scientist’ suggests that it is inaccurate to claim that words are restricted to certain functions based on their feature set – in other words, that there is no constant link between meaning and word. In contrast to Jackendoff’s separation of syntax and semantics, I will pursue the notion that grammar is in part constitutive of meaning, ‘shaping’ word-meaning so that it may mesh with the linguistic situation.

2.3 Judgement

There is one important respect in which the criticisms of intellectualism’s linguistic constancy hypothesis differs from those of its perceptual one: judgement. Merleau-Ponty was attacking the notion that judgement can account for the phenomenology of perception. I do not wish to claim that judgement in the traditional intellectualist sense is constitutive of linguistic experience. Rather, given that existential-phenomenological and embodied cognition approaches to language seek to develop a view of language that is “supra-communicative” (Clark: 1996 and 1998) – where language is *constitutive* of our ‘higher’ cognitive abilities – I wish to postulate judgement as a grammatical phenomenon. If this is correct, then although we might attempt to exclude judgement from perception we cannot do so in the case of linguistic experience. On this account, linguistic experience consists of many instances of speech (by ourselves and others), some of which are judgements. The crucial question therefore becomes how language makes judgement possible?

In this regard it is interesting to consider the following point of agreement between Jackendoff and Clark: that language makes possible ‘second order cognitive dynamics’, i.e. the ability to think about our own thoughts (Clark: 1998, 11). In accordance with the extended mind hypothesis, Clark considers linguistic structures to be those which allow us to “re-describe our own thoughts in a format which makes them available for a variety of new operations and manipulations” (ibid., 14). Clark therefore “applauds” Jackendoff’s argument (see Clark: 1996, 2; see above for discussion of Jackendoff). But, whereas Jackendoff takes this to validate the Cartesian contention that thought is prior to language, Clark instead takes this to imply the very opposite. Clark diagnoses the Cartesian position as an illusion caused by “mistaking the properties of the linguistically augmented and environmentally extended cognitive agent (the person plus a variety of external representations, especially texts) for the cognitive profile of the basic biological brain” (Clark: 1998, 14). Clark’s opinion seems to have been shared by Merleau-Ponty:

What misleads us... and causes us to believe in a thought which exists for itself prior to expression, is thought already constituted and expressed which we can

silently recall to ourselves, and through which we acquire the illusion of an inner life. But in reality this supposed silence is alive with words, this inner life is an inner language. (Merleau-Ponty: 2006, 213)

Clark dubs this the ‘mangrove effect’⁴⁰: “It is natural to suppose that words are always rooted in the fertile soil of pre-existing thoughts. But sometimes, at least, the influence seems to run in the other direction” (Clark: 1997a, 208). Although it might be natural, then, to suppose judgment is expressed in language, in this thesis I will suggest that language, as ‘supra-communicative’, makes judgement possible. In later chapters (‘the Schematism’ and ‘Truth’) I will argue that judgement is grammatically structured – that although it employs categories grounded in our embodied being-in-the-world, these categories alone are sufficient. This grammatical structure is the topic of the next chapter.

2.4 Summary

Merleau-Ponty argued that empiricism cannot make sense of perception via associations or projections of memories – either its explanations are incapable of accounting for perceptual unity or they presuppose what they purport to explain. Neither does intellectualism make perception comprehensible by invoking acts of judgements for this strategy begs the question of what it is that the operations of the intellect are directed toward. As Merleau-Ponty summarises it: “Empiricism cannot see that we need to know what we are looking for, otherwise we would not be looking for it, and intellectualism fails to see that we need to be ignorant of what we are looking for, or equally again we would not be searching” (Merleau-Ponty: 2006, 33).

Here I attempted to extend Merleau-Ponty’s arguments to a linguistic constancy hypothesis of an invariant link between word and meaning (or unit of verbal behaviour and corresponding stimulus). This line of argument seemed also be advanced by Merleau-Ponty himself. Although he did not use the term ‘linguistic constancy hypothesis’, he nonetheless seems to have rejected it: “...*expression*... is not suited point-by-point to what is expressed; each element is not specific and obtains its linguistic existence only from what it receives from the others and the modulation it induces into the rest of the system. It is the whole which possesses each meaning, not each part” (Merleau-Ponty: 1973b, 28).

The empiricist approach attempts to account for meaning in terms of a word being correlated to a salient aspect of experience or, in the case of behaviourism, in terms of a unit of verbal behaviour being triggered by a given stimulus. In the latter case, however, the

⁴⁰ The name refers to mangrove trees, which do not grow in land but instead grow their roots in water. The roots catch dirt in the water and, as more dirt is caught, form islands. Whilst it is intuitive to think that the land precedes the trees, in this case it is the trees that precede the land.

account is obscure because although this relationship is asserted, the behaviourist seems hard pressed to actually specify in virtue of what features this link is established. The account also appears circular as it seems that the use of units of verbal behaviour (illustrated most vividly with anaphoric pronouns such as ‘them’) presuppose linguistic structure, which is what the behaviourist account aims to explain. The associationist account also seems to encounter similar difficulties – although it is maintained that words are meaningful in virtue of being linked to salient aspects of experience, the associationist account appears unable specify in virtue of what this occurs, and how the same word may mean a range of things depending on its place within a wider, grammatically structured whole.

Jackendoff gives intellectualist account of linguistic experience where phonological qualia, considered necessary and sufficient for linguistic experience, are judged to be meaningful or not. A strict separation of phonology, syntax, and semantics is maintained on Jackendoff’s account, with judgements of meaning performed by the semantic system, mediated by syntactic structuring/arrangement. However, the syntax-semantics distinction appears to be undermined by the observations that, first, grammatical structure can impart a kind of meaning to words (illustrated by Lewis Carroll’s poem) and, second, it also seems to be the case that words can be used in a manner that is at odds with Jackendoff’s account (e.g. ‘Rachael chaired the mail to the scientist’). The distinction with phonology is undermined by the phenomena of click displacement and speech compression, which indicate that grammatical structure is present in experience as the phonological qualia can alter, despite identical ‘acoustic material’, depending on the wider, grammatically structured, linguistic expression.

The criticisms of the intellectualist position do not aim to remove the notion of judgement entirely from linguistic experience. Rather, in accordance with a ‘supra-communicative’ view of language, in this thesis I wish to treat judgment as a grammatical phenomenon. If correct, the phenomenon of judgement would be a ‘mangrove effect’ – the result, not the motivation behind, linguistic assertion. The question of how language makes judgement possible will be the topic of subsequent chapters.

3. Grammatical Structure

Language appears to present problems for the embodied cognition research program given the desire to avoid explanations based on internal symbols. One approach has been to model language as a dynamical system where words are considered regions of state space, and to implement such models on connectionist networks. The first section of this chapter examines some of these approaches and criticisms based on, first, their resemblance to finite state grammars and, second, their ability to faithfully capture the structure-dependent nature of language. Although the first type of objection might be avoided, the second still seems to present a formidable obstacle to such accounts.

The subsequent sections of this chapter will outline some central insights from generative linguistics concerning structure-dependency, most of which could perhaps legitimately be described as Cartesian – indeed, Chomsky, the founder of and major figure within the tradition, was very much aware that generative linguists were rediscovering the insights of the Cartesians (and romantics), and reawakening interest in problems “studied in a serious and fruitful way during the seventeenth, eighteenth, and early nineteenth centuries” (Chomsky: 2009a, 57). Generative linguistics has undergone several revisions since it was established during the ‘cognitive revolution’ of the 1950s, but a few core beliefs have remained unchanged – the emphasis on discrete infinity and nativism have both been deemed necessary for any adequate account of language; the second section of the chapter explains these concepts. The third section outlines some of the major revisions that have occurred in generative linguistics and illustrates the importance of questions concerning the interfaces of language with other mental systems. I suggest that the minimal operation required to account for linguistic structure may be conceived relating information from these other systems, and that these other systems are embodied. This minimal grammatical operation might therefore be the ‘spark that lit the intellectual forest fire’, offering a possible solution to the ‘paradox of active stupidity’, i.e. how an unaugmented mind is able to create cognitive technologies to augment it.

3.1 Speech and Structure

‘Inner symbol flight’, a strategy which seems integral to the embodied cognition program, is, at least at first glance, in tension with those representation hungry, higher cognitive abilities such as language (Clark: 2001, 71). The “leading expression” of inner symbol flight is, according to Clark, connectionism, which moves away from conceiving of intelligence as the manipulation of “static, atemporal, spatially localisable inner symbols” and instead introduces “highly distributed and increasingly dynamic (time-involving) inner states” (ibid.,

73). “Connectionism,” says Clark, shows “us how to believe in internal *representations* without quite believing in traditional internal *symbols*” (ibid., 120). The obvious question, then, is whether connectionist networks⁴¹ can adequately capture linguistic phenomena.

Clark maintains there to be a class of connectionist networks “that seem well suited to modelling and supporting... linguistic behaviour” (Clark: 1998, 198). These *recurrent* networks ensure that, at any given point in time, the network’s previous state is made available as part of the new input (Elman: 1989, 3). Hence, the state of the system at any one point in time is “some function which reflects their *prior* state” (Elman: 1995, *italics mine*). Drawing on his work with simple recurrent networks, Elman (1995) suggests that language and cognition might be considered the behaviour of a dynamical system where a linguistic expression is a trajectory through the system’s state space. Words, on this view, are regions of state space and, crucially, function as ‘attractors’ or ‘repellers’ that determine the trajectory. Importantly, because the state of the system is always a function of its prior state, there are no representations of words in isolation – “representations of words (the internal states following input of a word) always reflect the input taken together with the [network’s] prior state” (Elman: 1989, 23). Elman’s work thereby illustrates Clark’s “image of a fluid inner economy in which representations are constructed on the spot and in light of prevailing context and in which much of the information-processing power resides in the way current states constrain the future temporal unfolding of the system” (Clark: 2001, 72). Such representations are *dynamic*, not static.

Elman (1989) tasked a simple recurrent network with categorising the words in its input and predicting the next word in an ongoing sequence – in the latter task there are no unique solutions as many words will be grammatically acceptable, however there are entire classes of words that are impermissible (Elman: 1989, 4; Clark: 2001, 71). Elman’s network produced categories which were hierarchically structured – words constituting a class were closer to one another in the system’s state space (1989, 7). More specific words such as ‘cookie’ or ‘sandwich’, both part of the category ‘food’, were grouped closer together than were ‘cookie’ and ‘car’. The ‘higher’ the level of a category (e.g. ‘food’, ‘inanimate objects’, ‘nouns’, etc.), the larger and more general is the region of state space constituting the

⁴¹ More accurately: connectionist networks that are not simply *implementations* of classical symbolic systems. It is possible to implement symbolic, representationist models of language utilising parallel distributed processing, but such networks are not a part of the strategy of ‘inner symbol flight’ which seeks as far as possible to *replace* classical symbol systems. Networks implementing representationalist systems have prespecified structure whereas networks which aim to replace classical symbol systems *learn* structure (see Christiansen and Chater: 1999a).

category (1989, 7).⁴² The network was able to form categories by using the sequences which reliably occurred in the data. For example, “from the fact that there is a class of items which always precede ‘chase’, ‘break’, and ‘smash’, it infers a category of large animals (or possibly, aggressors)” (Elman: 1989, 7). If the network is in the region of state space constituting the category of large animals, then verbs ‘chase’, ‘break’ and ‘smash’ will function as attractors – that words function as attractors and repellers means they are “cues” which drive the expression through state space (ibid., 23). Consequently, instead of being operations on static symbols, on Elman’s account grammatical rules are embedded in the dynamics of the system itself (Elman: 1991, 210): movement from a given region to certain other regions (the attractors) is acceptable and therefore grammatical; transitioning elsewhere (to the repellers) is prohibited and is therefore ungrammatical. Words thereby drive the network through successive grammatical states.

Just as theories of embodied cognition emphasise the importance of structure already present in the environmental ‘data’, so too does the connectionist account of language emphasise the structural properties of language given in the linguistic ‘data’ (Lewis and Elman: 2001). However, connectionist approaches have been criticised on the basis that they cannot adequately capture the structure-dependent nature of language. In this section I will examine two types of criticism made by Chomsky on the basis of grammatical structure. The first sort of criticism concerns the suitability of ‘finite-state devices’ for the modelling of grammar – as Jackendoff points out: “Elman’s... widely cited recurrent network parser is a variant of a finite-state Markov device and is therefore subject to some of the same objections raised by Chomsky in 1957” (2007, 28). The second sort of criticism concerns whether a grammar is weakly or strongly generative – that is, whether it only generates a string of symbols or whether it also recognises structural units. I will briefly review both of Chomsky’s arguments and note that whilst the first does not necessarily seem definitive, the second argument appears to be highly effective.

Finite-state devices are simple machines comprised of an initial state, a finite number of states, a specification of how the machine transitions from one state to another, a specification of the symbol(s) to be produced when each particular state obtains, and a final state (Boeckx: 2006, 29). To produce a linguistic expression such as ‘The very old man’, the machine could start in a state where it had a choice between ‘The’ and ‘An’, then transition to a state where it must produce ‘very’, then transition to a state where it has the choice

⁴² Elman also notes that the category-boundaries were ‘soft’ in the sense that there could be regions of overlap between categories, occupied by entities which share properties of otherwise distinct categories (1989, 7).

between 'old' and 'young', and then transition to a state when it has a choice between 'man' and 'woman'. Assuming that in each case the finite-state machine chooses the first option, the expression 'The very old man' is produced. To allow the finite-state machine to produce an infinite amount of expressions, a 'loop' can be incorporated where a machine may repeatedly arrive at the same state. Using the same example, the machine might be given the choice to make a transition from the state at which 'very' is chosen to that exact same state, thereby producing expressions such as 'the very old man', 'the very very old man', 'the very very very old man', etc. The connectionist network described above, where grammatical rules are embedded in the dynamics of the system's transition from one region of state space to another, bears a resemblance to a finite-state device.

Chomsky's first book, *Syntactic Structures*, along with his early article 'Three Models for the Description of Language' (1956) argued that finite-state devices were either incapable of generating all of the grammatical expressions of a language or, if they are capable of generating all such expressions, they will also generate numerous ungrammatical expressions: "That is, it is impossible, not just difficult, to construct a device... which will produce *all and only* the grammatical sentences of English" (Chomsky: 2002, 21 *italics mine*). To support this claim, Chomsky invented some artificial grammars which each exhibited a type of recursive structure. I will use two of these grammars which, following Christiansen and Chater (1999a), I will refer to as 'counting recursion' and 'mirror recursion'. Counting recursion can be seen in the following strings of symbols:

ab
aabb
aaabbb
aaaabbbb

The pattern is simple to discern: a given number of a's must be followed by that same number of b's, or, more formally, $a^n b^n$ where $n > 0$. This is counting recursion because it is necessary to keep track of the number of a's produced in order to produce the correct number of b's. Next, consider the following strings each exhibiting 'mirror recursion' in the symmetry visible about the midpoint of each string – each has a structure consisting of a number of ordered symbols followed by that same number in reverse order:

aa
bb
abba
baab
aabbba

Chomsky argued that finite state devices, producing chains of symbols, have difficulty with the production of the above patterns because, as Pinker puts it, “a word-chain device is an amnesiac” (1995, 94). The only information these machines have is the state that they are in and the transitions which may be effected, but they do not recall how often they have been in a particular state nor do they recall the previous states they have been in (Boeckx: 2006, 30). The three patterns listed above all exhibit ‘long-distance dependencies’ in that if, say, an ‘a’ is replaced by a ‘b’, there will be another (nonadjacent) symbol which must also be replaced (Chomsky: 1956, 115). For example, in string generated by the ‘mirror-image’ grammar, say, ‘abba’, if the first ‘a’ is replaced with a ‘b’ then the final ‘a’ must also be replaced with a ‘b’ for the string to be ‘well-formed’ (so the new expression must read ‘bbbb’). But, because a finite-state device ‘knows’ only its current state and its prior state, it is unclear how it is to *ensure* that the correct *nonadjacent* symbols are placed in the expression (i.e. whilst it is possible that the finite-state machine could produce a well-formed expression, this outcome is not certain).

It could perhaps be argued that a finite-state device is conceivable that does not have to remember previous states – such a device would build in ‘subroutines’ to ensure that it could only produce grammatical statements. For example, when building a device that could accommodate mirror recursion the first state could produce ‘a’ or ‘b’ then force a transition to the state producing the appropriate second symbol: If the device selects ‘a’ initially, then it transitions to a state where there is no option to select ‘b’; if the device initially selects ‘b’, then it will transition to a state where the only option is to select ‘b’. In the former case ‘aa’ is produced; in the latter case, ‘bb’ is produced. However, whilst this design would work for strings of only two symbols, the machine would need to have additional subroutines built in for strings of symbols of length four, further subroutines for strings of length six, etc. Consequently, the device is simply incapable of handling recursion proper because its design implies that it can only ever go to a limited depth. Hence, if the device is built to incorporate subroutines and to ensure that only well-formed strings are produced, it will be incapable of generating well-formed strings which require ‘deeper’ recursive structure. However, if the device is fully recursive, it will be incapable of generating *only* well-formed strings.⁴³

Such count recursive and mirror recursive patterns, maintains Chomsky, are of a form that also occurs in natural languages – implying that finite state devices of language are

⁴³ Relying on such subroutines is also extremely ad hoc solution as each new routine is built for a particular string, and these new subroutines must be of increasing complexity (and be created at an increasing rate) for strings of greater and greater lengths, resulting in a combinatorial explosion. Consequently, it seems to lack explanatory value.

susceptible to exactly the same criticism (1956, 115). Long distance dependencies can be seen in the following three examples:

If S_1 , then S_2
 Either S_3 , or S_4
 The man who said S_5 , is arriving today

The presence of 'If' in the first example requires 'then', in the second example the presence of 'Either' requires 'or', and in the third 'man' requires 'is'. As Chomsky emphasised, replacing one of the initial symbols requires replacement of the corresponding subsequent symbol – for example, replacing 'If' with 'Either' in the first example requires replacing 'then' with 'or'. A kind of 'counting recursion' seems operative here, and can be illustrated by noting that each example can be embedded within one of the others – that each of the expressions in the above examples might be substituted for S_{1-5} . For example, the first expression can be repeatedly substituted for S_1 , yielding:

If S_1 , then S_2
 If if S_1 , then S_2 , then S_2
 If if if S_1 , then S_2 , then S_2 , then S_2

And so on *ad infinitum*. In each case the number of required instances of 'then' is determined by the number of instances of 'if'. By contrast, mirror-recursion seems to correspond to 'centre embedding' and can be seen in the following expressions which each require that a noun be matched with a particular nonadjacent verb (Christiansen and Chater: 1999a, 162):

[The mouse ran away]
 [The mouse [that the cat bit] ran away]
 [The mouse [that the cat [that the dog chased] bit] ran away]
 [The mouse [that the cat [that the dog [that the man frightened] chased] bit] ran away]

Chomsky's proof, as he acknowledges, presupposes there to be no upper limit on the operation of these grammatical processes. Hence, Chomsky's objection might be avoided by "an arbitrary decree that there is a finite upper limit to sentence length in English" (Chomsky: 1956, 115). But this is to miss the wider point that there "processes of sentence formation" which a finite state grammar "is intrinsically incapable of handling" (ibid., 115).⁴⁴

⁴⁴ Further, as noted in footnote 43, even if grammatical processes have a limit, thereby making the construction of an adequate finite-state grammar theoretically possible, it nonetheless appears to be the case that "this grammar will be so complex as to be of little use or interest" (Chomsky: 1956, 115).

However, the connectionists point out that as certain linguistic constructions such as centre-embedding become more complex they rapidly become incomprehensible, despite conforming to the recursive structures ascribed to linguistic competence. To Christiansen and Chater, this suggests that we ought to take human abilities to handle recursive structures as the “benchmark” by which we judge networks and, given that the sort of recursive structures found difficult by recurrent networks are the sort of structures humans also find difficult, we should “account for human performance on recursive structures as emerging from intrinsic constraints on the performance of a particular connectionist architecture” (1999b, 159). Christiansen and Chater trained some networks on the types of complex recursive structures identified by Chomsky (1956) and found that their networks performed similarly to humans – in both cases performance levels degraded at a similar rate as the levels of recursive embedding increased. Therefore, a theory concerned with modelling psychological processes need not take “the purported unbounded recursive structure of natural language as axiomatic” nor should the theory “take for granted the suggestion that a speaker/hearer’s knowledge of language captures such infinite recursive structure” (Christiansen and Chater: 1999b, 158). The connectionists’ point is that we need not require of recurrent neural networks that they be able to handle recursion in “full generality” (ibid., 159). An ‘upper limit’ on recursive grammatical processes, as a consequence of the limitations intrinsic to the network itself might not, therefore, be unreasonable.

Given that such recurrent networks also seem to retain some information regarding their previous states, it is also unclear that depicting them as a finite state machine is accurate. In Wiles and Elman’s (1995) network, trained on count recursion, the experimenters’ analysis found that the network had developed an *oscillator* (as opposed to an explicit counting mechanism), which allowed the network to generalise far beyond the depth of the strings presented during training.⁴⁵

Admittedly, the networks seem to have far more support than a child does during language acquisition, which might jeopardise the connectionists’ claims for their networks when set beside the exposure to linguistic data that children actually receive. When Wiles and Elman’s (1995) network learned count recursion, for example, it was put through 1-3 *million* training cycles. Despite the network’s impressive results it seems doubtful that children receive this much support when they acquire language. Nevertheless, it should also be acknowledged that this is not an a priori argument against recurrent neural networks and that

⁴⁵ The network was trained on expressions from the grammar $a^n b^n$ where n was between within the range of 1 and 12. They found that the network was able to generalise to $n = 21$, and as experimenters manually adjusted a few weights they found that n could be increased to 85.

the networks have demonstrated the possibility that certain problems might be solved without an in-built device designed for a specific purpose – perhaps further advances in this area could significantly cut down the required quantity of training cycles whilst still avoiding becoming an implementation of classical symbol systems.

In generative linguistics, difficulties of interpreting expressions with complex recursive embedding are attributed to ‘performance’ factors, and are therefore considered irrelevant to a study of linguistic competence. Those utterances which are immediately understandable “without pencil and paper analysis” are termed ‘acceptable’, whereas those which we find “bizarre or outlandish” are dubbed ‘unacceptable’ (Chomsky: 1965, 10). However, Chomsky emphasises that the notion of acceptability, “a concept that belongs to the study of performance”, should not be confused by grammaticality, which “belongs to the study of competence” (ibid., 11). That a given expression might be judged unacceptable does not thereby make it ungrammatical; we might still deploy our linguistic competence via ‘pencil and paper analysis’ to reach the conclusion that the expression in question is, in fact, grammatical despite being unacceptable.

Whereas Chomsky views the unwillingness to perform an abstract study of competence as a “fatal inadequacy” (Chomsky: 2010, 99), the connectionists counter that grammatical but ‘unspeakable’ sentences might instead indicate the need to rethink the competence/performance distinction (Christiansen and Chater: 1999b, 201). Hence, the connectionists also maintain that it is an assumption to consider that a set of recursive rules constitutes knowledge of language (ibid., 158). This focus on performance is why the connectionists evaluate their network’s abilities by tasking the network with predicting the next word in an expression, rather than judging the grammaticality of a complete expression (which would be a test of competence – see ibid., 168).

The relative difficulty of certain judgements of grammatical well-formedness might suggest another line of argument against the mind as “rational deliberator” and in favour the mind as “well camouflaged adaptive responder” (Clark: 1998, 33). The ability to judge certain expressions as well-formed – “which”, Christiansen and Chater (1999b, 168) note, “is often assumed to relate to linguistic competence” – despite that those expressions might be extremely difficult to understand, might be testament to the power of *the tools developed by linguistics* rather than being indicative of a linguistic competence independent of performance. Explicitly identifying an expression’s phrase structure via ‘pencil and paper’ analysis allows us to treat groups of words as single units, thereby transforming the nature of the problem space confronting us and enabling us to grasp the relations between the units of the expression. The

tools of linguistic analysis, just like the words of language, might thereby be characterised as “advanced species of external scaffolding ‘designed’ to squeeze maximum coherence and utility from fundamentally short-sighted, special-purpose, internally fragmented minds” (Clark: 1998, 33). This scaffold might thereby allow us to make sense of linguistic structures which would otherwise exceed our biologically basic capacities. Centre-embedded constructions (exhibiting ‘mirror-recursion’) in particular appear extremely difficult to understand – psycholinguistic studies have indicated that English sentences with more than one centre embedding are read with the same intonation as a random list of words, cannot be easily memorised, and are judged to be ungrammatical (see Christiansen and Chater: 1999b, 163).

If structure is already in the linguistic environment and this structure is crucial to learning, and if recurrent networks – which do not seem to have linguistic competence – encounter difficulties with the same types of linguistic structures that we have difficulties with, then the question arises as to whether any notion of competence is required at all. Whilst connectionism appears to have demonstrated the power of statistical regularities in linguistic structure, it nonetheless appears that recurrent networks face another formidable obstacle concerning grammatical structure – such networks appear to be at best *weakly* generative. That is, they may produce and/or identify patterns in strings of words, but they do not seem able to fully accommodate the structure-dependent nature of language – as previously noted (see chapter 1, above), structure dependence is built into Chomsky’s notion of I-language. A grammar can be considered to have attained weak generative capacity if it generates the set of well-formed expressions, and two grammars are considered weakly or extensionally equivalent if they generate the same strings. By contrast, a grammar is *strongly* generative if it assigns explicit structural descriptions to its strings: “each structural description uniquely specifies a sentence, but not necessarily conversely” (1965, 60). To illustrate Chomsky’s point, consider the following example (from Steedman: 1999, 619):

Put the block in the box on the table

Although this is a single string of words, English-speakers will be able to detect an ambiguity – either a block is to be put into a box and this box is on the table, or there is a block in a box and this block is to be put on the table. This single sentence may therefore be specified by two structural descriptions, one treating ‘the block in the box’ as a structural unit and the other treating ‘the box on the table’ as a structural unit (square brackets illustrating the structural units):

Put [the block in the box] [on the table]

Put [the block] [in the box on the table]

Linear order alone cannot differentiate between these two meanings; some notion of hierarchical structure is required. Recall that Elman (1995) proposes that any linguistic meaning might be defined as a trajectory through state-space determined by the words in the string. Although this might suffice for weak generativity, it is unclear how simple recurrent networks can attain strong generative capacity given that even where both the senses and syntactic categories of words are explicit, this is not sufficient to distinguish between differing structural descriptions.

Perhaps, in line with themes of ‘cognitive extension’, it could be argued that these different meanings might be differentiated by *pragmatics*, i.e. that circumstances within which the language-user is situated might be able to distinguish between the two expressions: in one situation there is a block in a box; in another, there is a box on a table. However, this response seems to miss the fundamental point that sequential order does not seem capable *in principle* of explaining the ambiguity precisely because such ambiguity is a structural phenomenon. This may be further illustrated with cases of ‘syntactic gestalt switches’ (taken from Pinker: 1995, 102):

Two cars were reported stolen by the Groveton police yesterday
Tonight’s program discusses stress, exercise, nutrition, and sex with Celtic
forward Scott Wedman, Dr. Ruth Westheimer, and Dick Cavett
We will sell gasoline to anyone in a glass container
For sale: Mixing bowl set designed to please a cook with round bottom for
efficient beating

Each of the examples can ‘flip’ between two grammatical structures, significantly altering the perceived meaning, though in each expression the linear order remains constant. Considerations concerning structure-dependency also apply to the relations *between* expressions. Berwick et al. illustrate this with using a ‘polar interrogative’ (2011, 1209):

Can [eagles that fly] eat?
[Eagles that fly] can eat
[Eagles that can fly] eat

As Berwick et al. note, the second expression is unambiguously recognised as the answer to the first (the polar interrogative). The third expression cannot be an answer to this particular polar interrogative – though a question that it could answer may easily be formulated: ‘Is it the case that eagles that can fly do eat?’ (2011, 1211). In other words, we understand in the first expression – the question – that ‘can’ is linked with the verb ‘eat’, not

with the verb ‘fly’. The reason for this is structure dependence: [eagles that fly] is a structural unit and the verb ‘fly’ is embedded within this unit, meaning that although ‘eat’ is further from ‘can’ in terms of the linear order of the expression it is actually *closer* in terms of the levels of hierarchical embedding, and it seems to be this hierarchical embedding that determines what word ‘can’ is linked to. Because the relations between an interrogative and its corresponding declarative are structural, it is unclear how a theory which can achieve at best weak generative capacity may account for them.

Hence, something beyond linear order is required in order to account for this sort of grammatical structure. As Steedman summarises

...the sole task that the SRN [i.e. simple recurrent network] is required to do is predict the next word or word category at each point in the string. We know from work on symbolic finite-state models... that such approximations can achieve very high accuracy – better than 95% precision – without having any claim whatsoever to embody the grammar itself. (1999, 619)

None of this is to suggest that work on recurrent neural networks provides *no* insights – such models might be “a very good way of building stochastic part-of-speech disambiguators as an input to parsing proper” (ibid., 620).⁴⁶ Connectionist networks, as Jackendoff puts it, have “shown that rather elementary statistical procedures can lead to much more sophisticated behaviour and learning than could [previously] have been imagined” (2003, 89). Nonetheless, taken together, the structure dependent nature of language seems to suggest that we cannot regard grammar as being adequately captured by finite-state devices or simple recurrent networks.

3.2 The Language Faculty: Broad and Narrow Senses

A strongly generative grammar will generate the correct set of structural descriptions, and Chomsky refers to a theory of language as ‘descriptively adequate’ if its “strongly generative capacity includes the system of structural descriptions for each natural language” (Chomsky: 1965, 60). Although generative linguistics has undergone several major revisions since its inception, there are several core beliefs which have remained integral to the generative research program precisely because it aims to account for the structure-dependency of language.

⁴⁶ Interestingly, Steedman also claims that simple recurrent networks “can in principle be used to look at string contexts that extend beyond the sentential boundary” (1999, 620). An adequate account of language will have to take into account the meaningful relations between expressions as well as those within expressions. Such a project is outside the scope of this thesis.

First, language is based on ‘discrete infinity’ – a finite set of simple, i.e. indivisible, units of language which may be (re-)combined to yield an infinite domain of possible phrases and sentences (Chomsky: 2005b, 3). In Humboldt’s words, language makes “infinite employment of finite means” (Humboldt: 1999, 91). As Chomsky has pointed out, Humboldt’s words looked “like an inconsistency” until mathematics and studies of formal systems produced recursive function theory (2009b, 62; see also 1965, 8). Recursion, displayed in the examples of ‘count’ and ‘mirror’ structures above, is the notion that you can apply a rule to an object to yield a result, and then apply the same rule again to its result to get a new result, and so on.⁴⁷ Repeated, or *recursive*, applications of the same rules allow a finite set of rules operating on a finite set of objects to yield an infinite domain of results, thereby accounting for linguistic creativity (Chomsky: 1965, 8; see also chapter 1, above).

Second, this property of (recursive) discrete infinity appears to be unlearned:

...unless the mind already possesses the basic principles, no amount of evidence could provide them... no child has to learn that there are three and four word sentences, but no three and a half word sentences, and that they go on forever; it is always more possible to construct a more complex one, with a definite form and meaning. (Chomsky: 2005b, 4)

Consequently, generative linguists are nativists in that they consider language an endowment common to our species. Language is conceived as an innate mental ‘module’, ‘faculty’, or ‘organ’ in the sense that we may speak of ‘organs of the body’, that is, “a subsystem of a more complex structure” and “an expression of the genes” (ibid., 4). This seems to be the case for many of the generativists’ rationalist and romantic progenitors. For Descartes, language use was the mark of rationality and required postulation of *res cogitans* to explain it; language elevated man above all animals in the ‘great chain of being’ (see Chomsky: 2009a, 65; see also chapter 1, above).

Such nativism, however, does *not* consider this language faculty to be “a cartoonish ‘grammar box’, cut off from the rest of the mind” (Jackendoff: 2003, 79). Not only do generative linguists seek to attribute as little as possible to innate language-specific knowledge, but since generative linguistics’ earliest years there has been an appreciation that the language faculty should not be taken to be divorced from other parts of the mind:

...we do not, of course, imply that the functions of language acquisition are carried out by entirely separate components of the abstract mind or the physical brain... In fact, it is an important problem for psychology to determine to what

⁴⁷ Mathematically, recursion can be illustrated as follows: $f(x) = x^2$ can be applied to 2 to get 4, applied to 4 to get 16, applied again to 16 to get 256, and so on *ad infinitum*.

extent other aspects of cognition share properties of language acquisition and language use, and to attempt, in this way, to develop a richer and more comprehensive theory of mind. (Chomsky: 1965, 207)

In more recent work, Chomsky has distinguished between ‘broad’ and ‘narrow’ senses of the faculty of language, abbreviated to FLB and FLN respectively (see Hauser et al.: 2002). FLB delineates the computational system which builds linguistic structure (and hence accounts for the structure dependence of language), as well as other psychological systems which it interfaces with. These other systems are referred to as the conceptual-intentional system, which is considered the domain of thought, and the sensory-motor system, which are the bodily mechanisms responsible for the externalisation of linguistic structures. FLN is the abstract computational system alone; it “is a component of FLB, and mechanisms underlying it are some subset of those underlying FLB” (Hauser et al.: 2002, 1571).

Interestingly, Chomsky has stated that “the traditional two-interface assumption – sound and meaning – is presumably an approximation” (Chomsky: 2008, 122). The assumption, says Chomsky, dates back to Aristotle and is invoked because language is considered the pairing of sound and meaning – hence one system at one interface is concerned with sound, the system at the other concerned with meaning (Chomsky: 2008, 158). This assumption “didn’t matter much” in early theories of generative grammar, however in more recent accounts of generative grammar questions concerning the interfaces have assumed increasing importance (Chomsky: 2008, 158). To see why, it is necessary to examine the development of generative linguistics.

3.3 Descriptive and Explanatory Adequacy

A descriptively adequate theory is not necessarily an *explanatorily* adequate theory, and even if “descriptive adequacy... is by no means easy to approach, it is crucial for the higher development on linguistic theory that much higher goals than this be pursued” (Chomsky: 1965, 24). The ‘higher’ goal of explanatory adequacy is essentially the problem of language acquisition, that is, how a child, on the basis of limited linguistic evidence, or the ‘primary linguistic data’ may develop full linguistic competence. Because an infinity of theories are compatible with any given set of data, a theory which is explanatory adequate will be one which selects a descriptively adequate grammar, i.e. a grammar capable of generating an infinite domain of expressions, on the basis of the limited primary linguistic data (ibid., 25). Hence

...a grammar is justified to the extent that it is a *principled* descriptively adequate system, in that the linguistic theory with which it is associated selects this grammar over others, given primary linguistic data with which all are compatible... The problem of internal justification – of explanatory adequacy – is

essentially the problem of constructing a theory of language acquisition, an account of the specific innate abilities that make this achievement. (ibid., 27)

However, there was initially a tension between the demands of descriptive adequacy and those of explanatory adequacy. To see this, it is helpful to briefly examine the history of generative linguistics. The first incarnation of generative linguistics, ‘standard theory’, was a theory of transformational phrase structure grammar. The phrase structure grammar was conceived as a system of rewrite rules, where ‘ $X \rightarrow Y$ ’ means ‘rewrite X as Y’ (Chomsky: 2002, §4.1):

$S \rightarrow NP + VP$
 $NP \rightarrow T + N$
 $VP \rightarrow V + NP$
 $T \rightarrow \text{the}$
 $N \rightarrow \text{man, ball, etc.}$
 $V \rightarrow \text{hit, took, etc.}$

Through the application of these rules it is possible to yield a phrase such as ‘the man hit the ball’, where the rewriting operations can be depicted via branches in ‘tree diagrams’. However, Chomsky also argued that phrase structure grammars are not *fully* adequate models as they fail to neatly capture certain linguistic phenomena such ‘crossing dependencies’ (Boeckx: 2006, 37). A crossing dependency can be illustrated by considering a phrase in the past perfect tense such as ‘had been’. A natural choice to form this expression from the verb ‘be’ is a single rule that inserts the morphemes indicating past perfect tense – however a single rewrite rule would have to replace a single symbol with both ‘had’ and ‘-en’ (i.e. the latter half of ‘been’), implying that these symbols will end up adjacent to one another rather than in their proper position either side of ‘be’ (incorrectly yielding either ‘*had -en be’ or ‘*be had -en’). A phrase structure grammar *could* be designed which would overcome such problems, say by using two different rules to insert each element around the verb. However such a solution would be being “extremely complex, *ad hoc*, and ‘unrevealing’” (Chomsky: 2002, §5.1). To overcome this problem, Chomsky proposed supplementing the phrase structure grammar with a transformational component, that is, a set of operations which would take derivations formed by the phrase structure grammar and transform them into sentences.

Derivations formed by the ‘base’ phrase structure grammar were referred to as ‘basic strings’, each of which had an associated ‘structural description’ called a ‘base Phrase-marker’, i.e. the basic string’s syntactic structure (Chomsky: 1965, 17). Base Phrase-markers were considered the constituent units of *deep structure*, and a given sentence’s *basis* (i.e. its deep

structure) was defined as a set of such base Phrase-markers. A *surface structure* is formed from a given basis via transformational operations (ibid.).⁴⁸ Chomsky held that the deep/surface structure distinction was a more modern and explicit version of the older, Cartesian Port-Royal theory (see Chomsky: 2009a, 83), and uses an example from the Port Royal theory to illustrate this (see ibid., 80). ‘Invisible God created the visible world’ is a surface structure formed via transformations from a basis consisting of three basic strings: ‘that God is invisible’; ‘that He created the world’; and ‘that the world is visible’. Because base Phrase-markers contain no crossing dependencies, and because a surface structure is formed via transformations from its basis, the problem of crossing dependencies occurring in cases such as English verbal auxiliaries (see above) can be eliminated (see Chomsky: 2002, §5.3).

Standard theory is considered to have surpassed its Cartesian predecessors in that it offered formalised descriptions of grammars (see Chomsky: 2009a, 96-7; see also McGilvray 2009, 26-8), allowing it to meet the demand of “descriptive adequacy”, that is, to “correctly [describe] the intrinsic competence of the idealised native speaker” (Chomsky: 1965, 24). However, when addressing “explanatory adequacy”, that is, accounting for how the child can acquire their grammar on the basis of the available linguistic data in its environment (ibid. 25), standard theory was presented with a paradox:

On the one hand, [a theory of UG] must be compatible with the diversity of existing (indeed, possible) grammars. At the same time, UG must be sufficiently constrained and restrictive in the options it permits so as to account for the fact that each of these grammars develops in the mind on the basis of quite limited evidence. (Chomsky: 1981, 3)

This was especially problematic given that *Aspects* suggested a relative choice/learning procedure: “a child must devise a hypothesis compatible with present data – he must select from the store of potential grammars a specific one that is appropriate to the data available to him” (Chomsky: 1965, 36; see also McGilvray: 2009, 28-9). This would imply that the child already has a multitude of innate, highly complex grammars and then selects between them. The sheer quantity of information made this extremely implausible.

Initial attempts to resolve the tension between descriptive and explanatory adequacy focused revealing that the apparent complexity of such grammars is superficial (Chomsky: 2008, 93). For example, instead of postulating multiple phrase structure rules, each producing a particular type of phrase (e.g. verb phrase, noun phrase, prepositional phrase, etc.),

⁴⁸ Initially deep structure was thought to determine “semantic interpretation” and surface structure to determine “phonetic interpretation” (Chomsky: 1965, 16). Later ‘logical form’ would be considered the level of representation which determined semantic interpretation.

common structures across phrases implied that there might only be a single phrase – an ‘X’ phrase (XP) – which takes the identity of its head (‘X’), e.g. when the head is a noun (N) the phrase will be an NP. This ‘X-bar theory’ therefore replaced a multitude of different phrase structure rules.

Another extremely important simplifying development was the notion of a ‘constraint’. Standard theory, maintaining phrase structure and transformational rules must produce all and only grammatical derivations, was forced to create ever more elaborate sets of *specific* grammatical operations in light of new data due to the demand of descriptive adequacy. Each new operation increased the tension with the demands of explanatory adequacy. An alternative strategy was developed which allowed *general* grammatical operations, e.g. ‘move- α ’ (or ‘move anything anywhere’), which were then *constrained* to prevent ungrammatical derivations being generated. For example, one of the first constraints identified was the ‘*wh*-island constraint’, which stipulated that ‘*wh*-words’ (e.g. ‘what’, ‘why’, ‘whether’, ‘when’, etc.) may not be moved across another *wh*-word (example from Boeckx: 2006, *italics mine*):

- (1) John *said that* Bill bought something
- (2) What did John *say that* Bill bought?
- (3) John *asked whether* Bill bought something
- (4) *What did John *ask whether* Bill bought?

Although (1) may be transformed into (2), (3) may not be analogously transformed into (4) and the *wh*-island constraint serves to prevent such a structure from being generated. Much of the history of generative linguistics from the end of the 1960s, says Boeckx, can be considered “the detailed articulation of a system of general principles/conditions on syntactic processes” (ibid., 46).

However, it was when such simplifications were brought together under the ‘principles and parameters’ approach (P&P) that the tension between descriptive and explanatory adequacy was resolved. P&P, the second major incarnation of generative linguistics, postulates that there are a number of “fundamental principles that sharply restrict the class of attainable grammars and narrowly constrain their form” but that such parameters “have to be fixed by experience” (Chomsky: 1981, 3). For example, although X-bar theory stipulates that every phrase must have a head (the principle), whether the complement precedes or follows the head may vary (the parameter). In Japanese, the complement precedes the head:

[[the ball] kick]

Whereas in English the complement follows the head:

[kick [the ball]]

Standard theory assumed that one grammar could not account for all the full range of linguistic phenomena and thus conceived the problem of explanatory adequacy as finding an evaluation metric, enabling the child to choose the correct grammar from a number of competing options. P&P, conceiving of language learning as the setting of parametric ‘options’, renders such an evaluation metric redundant, thereby reconciling descriptive and explanatory adequacy.⁴⁹

The third major incarnation of generative linguistics – the minimalist program (MP) – might be thought of a means to judge which of the many possible P&P models is correct (Boeckx: 2006, 59). MP’s evaluative criterion is very Cartesian in nature: because the language faculty interfaces with the conceptual-intentional system at the level of logical form (which determines meaning) and with the sensory-motor system at the level of phonetic form (which determines sound/gesture), the language faculty could be considered a solution to the ‘engineering problem’ of how to relate meaning and sound. A ‘perfect’ solution to this engineering problem would have no superfluous features, i.e. nothing more than, first, what is required for linguistic structures to be interpretable by the conceptual-intentional and sensory-motor systems (i.e. legibility conditions at the interfaces) and, second, what is “induced in some natural way by the computation itself” (Chomsky: 2005b, 11).⁵⁰ MP’s aim is therefore to “show that everything that has been misdescribed, and is as well or better understood in terms of legibility conditions at the interface” (ibid., 10) – this is ‘virtual conceptual necessity’. For example, standard theory’s two ‘syntax-internal’ levels of representation – deep and surface structure – should be eliminated as neither deep nor surface structure is necessitated by legibility conditions at the interfaces. At most, virtual conceptual necessity sanctions logical form (which the representation must assume to be intelligible at the conceptual-intentional interface) and phonetic form (which the representation must assume to be intelligible at the sensory-motor interface). Arguably

⁴⁹ Husserl seems to have been sceptical of a ‘principles and parameters’ approach (though he did not refer to it by that name): “...no one will imagine that there could be a universal grammar in the sense of a universal science comprehending all particular grammars as contingent specifications, just as a universal mathematical theory contains all possible cases a priori in itself, and settles them all ‘in one go’” (Husserl: 2001, 75).

⁵⁰ Importantly, ‘minimalism’ refers to the minimal apparatus to satisfy interface conditions. It does *not* refer to Occam’s razor – like any responsible science enterprise, MP attempts to fully account for linguistic phenomena with minimal theoretical and descriptive apparatus, but this does not distinguish it from earlier incarnations of generative linguistics.

minimalism needs no levels of representation *at all* – rather, instead of forming a complete representation, the language faculty might simply send ‘chunks’ of information to the relevant interface (Boeckx: 2006, 76). Consequently, linguistic derivations might be performed in *phases*.

Given the importance of the interfaces in MP, it is no longer the case that the two interface assumption does not matter: “[from] the fact that the essential property of language must be that it satisfies interface conditions – and that much, everybody has to accept – then the question arises: what are the interfaces?” (Chomsky: 2008, 158) The purpose of this thesis is not to give a theory of the interfaces, but chapters 4 and 5, focusing on the grounding of determiners and aspect in the structures of embodiment, might perhaps be said to be concerned with the interfaces with those embodied structures. This approach seems similar to that of Jackendoff, who treats lexical items as interface rules and points out that “lexical items include not just words but productive morphological affixes” (2003, 425). However, the approach differs from Jackendoff’s in that grammar is not considered to be a semantics-independent syntax but rather a system which structures meaning. Further, following MP, I use only a very sparse notion of grammatical structure.

In seeking to explain as much as possible in terms of the interfaces with other mental systems (together composing FLB), MP attempts to reduce the contributions of FLN as much as possible, attempting “to account for the knowledge attained with the sparest plausible language-specific schematism” (Berwick: 2011, 1210). Optimal design would suggest that syntax introduces no new information during a derivation but works instead only with what is given at the interfaces (this is known as the ‘inclusiveness condition’). The top-down structure of X-bar theory is discarded in favour of a bottom-up theory of ‘bare phrase structure’, where categories and constructions are derived from “properties of lexical items” (see Chomsky: 1995, 249). Phrase-structure rules are “eliminated entirely in favour of the irreducible operation that takes two objects already formed and attaches one to the other, forming a larger object with just the properties of the target of attachment: the operation we can call merge” (Chomsky: 2005b, 13).⁵¹ Hence two objects such as ‘the’ and ‘block’ can be merged to form the phrase ‘the block’, and because merge is recursive it can be applied to merge ‘the block’ with another word or phrase, such as ‘in the box’ to give ‘the block in the box’. This approach is strongly generative as identically ordered strings of symbols might have a different structure given by how their constituents have been merged together.

⁵¹ Here I set aside complications regarding distinctions between internal and external merge, movement, etc.

Despite being sparse, this conception of grammar nonetheless seems sufficient to structure the relations between lexical items. Whilst, then, I wish to accept the supra-communicative view of language on which “*the word has a meaning*” (Merleau-Ponty: 2006, 206), i.e. that a given word functions as “a sort of cognitive building block” (Clark: 2001, 144), and whilst I wish to accept that word meaning is grounded in our embodied being-in-the-world, I also wish to emphasise Chomsky’s insight concerning the structure-dependence. In the rest of the thesis I will suggest that such a sparse grammatical structure makes possible our distinctly human reasoning capabilities and that grammatical relations allow structures of meaning beyond those given in embodied experience. In the next section, however, I suggest that acknowledging the structures of details may resolve a problem for the embodied cognition research program – the paradox of active stupidity.

3.4 The Paradox of Active Stupidity

If words are technologies serving as “part and parcel of the mechanism of reason itself” (Clark: 1998, 207), then they may be understood as “affording *complementary* operations to those that come naturally to biological brains” (Clark: 2001, 142). Just a pair of scissors may interlock with our hands, allowing us to transform our manipulative ability into a cutting ability, so too do cognitive technologies interlock with our brain. However, Clark recognises that this account seems to lead to a paradox: if our brains were ‘stupid’ prior to the invention of cognitive technologies then how would they have been able to invent the technology in the first place? Similarly, if our brains were smart enough to create the technology, why would they need it? This is the ‘paradox of active stupidity’: “Surely, the worry goes, only intrinsically *smart* brains could have the knowledge and wherewithal to create such cognitive technologies in the first place” (Clark: 2001, 150).

Of course, it need not be the case that the ‘naked brain’ be intelligent enough to design all possible cognitive technologies. The development of better and better technologies may be seen as a kind of “iterated bootstrapping operation” where a brain and first generation technology together “design and create the new, enriched technological environments in which (new) brains and (second generation) cognitive technologies again conspire, producing the third-generation environment for another set of brains to learn in, and so on” (ibid., 151). An account based on ‘bootstrapping’ still leaves open the question of how the first generation cognitive technology was developed. The explanation for this probably, as Clark puts it, “turns in some way... on the distinctive features of the human brain” (ibid., 150). Importantly, then, to conceive of language as cognitive technology is *not* to deny there to be anything distinctive about our neural architecture when compared to that of other

species. Rather, it is “to depict any such differences as the *seed*, rather than the full explanation, of our cognitive capabilities. The idea is that some relatively *small* neural (or neural/bodily) difference was the spark that lit a kind of intellectualist forest fire” (ibid., 151).

Clark therefore agrees that language is species-specific, but emphasises that our powerful cognitive abilities might have a relatively minor alteration of our neural architecture:

...humans *are*, it seems, the only animals capable of acquiring and fully exploiting the complex, abstract, open-ended symbol system of public language. Nonetheless, we need not suppose that this requires major and sweeping computational and neurological differences between us and other animals. Instead, relatively minor neural changes may have made basic language learning possible for our ancestors, with the process of reverse adaptation thereafter leading to linguistic forms that more fully exploit pre-existing, language independent cognitive biases (especially those of young humans). (Clark: 1998, 212)

More sophisticated cognitive technology is thus, at least in part, technology which better ‘meshes’ with our pre-existing cognitive structures – hence although our brains presumably needed to evolve to give us linguistic capacities, it might also be the case that (e-)language needed to evolve in order to better “exploit the contingencies and biases of human learning and recall” (ibid., 194). The conjecture I make here, and essentially explore in the rest of this thesis, is that this relatively minor difference might be the minimal grammatical operation which relates information from different embodied-mental systems, thereby accounting for the “*productive collision points* of multiple factors and forces – some bodily, some neural, some technological, and some social and cultural” (Clark: 2001, 141). This conjecture also accords with the spirit of the distinction between FLB and FLN which was intended to “help the field to see that there is no incompatibility between the hypotheses that FLB is an adaptation that shares much with animals, and that the mechanism(s) underlying FLN might be quite unique” (Fitch et al.: 2005, 183). The evolution of language might thus be made more tractable if “aspects of FLB are shared with other cognitive domains (e.g. number, navigation, music, social intelligence)” and FLN is minimised – a minimal FLN being “easier to implement neurally, easier to code genetically, and easier to evolve” (ibid., 184).

3.5 Summary

This chapter has been concerned with the structure dependence of language. The first section noted that – at present – it seems to be the case that models of language as dynamical systems implemented on connectionist networks are, at best, weakly generative. To capture structure dependency something more is needed. Generative grammar has always maintained that a descriptively adequate account of language must be based on discrete infinity, and that

this principle of discrete infinity is unlearned. However, due to the demands of explanatory adequacy, generative linguistics has had several major incarnations: standard theory postulated phrase structure rules supplemented by a transformational components; principles and parameters rejected the relative choice/learning procedure of standard theory, made language acquisition a matter of parameter setting, and greatly simplified its descriptive apparatus; the minimalist program attempts to explain language in terms of only those features which ensure that information from the language faculty is legible by other psychological systems at the interfaces. Although there has been an assumption of two interfaces, with minimalism's strategy the question of the nature and quantity of interfaces takes on a new importance. In this chapter I have suggested that we might think of language as interfacing with embodied systems via words whose meanings are grounded in these systems, and therefore that these in part constitute FLB. However, due to the structure dependency of language, something additional is required – the conjecture is that the minimal grammatical operation sufficient to capture structure dependency relates information from different embodied systems and is therefore the 'spark that lit the intellectual forest fire'.

4. Determiners, Deixis, and Embodiment

4.1 Grounding Symbols

'Grounding' a symbol is giving that symbol meaning by mapping it onto something else which is already meaningful (Glenberg et al.: 2005, 115). Merleau-Ponty's early work attempted to ground linguistic meaning in embodied perceptual experience: "the body converts a certain motor essence into vocal form" (Merleau-Ponty: 2006, 210). Contra Husserl, who takes the paradigmatic example of language use to be judgement (1980, §7), Merleau-Ponty initially viewed language in terms of bodily gesture. This postulated that the relationship between the ideal meanings of language and those of pre-predicative experience is *non-reductive*, instead being better represented by the "two-way relationship that phenomenology has called *Fundierung*" (Merleau-Ponty: 2006, 458), i.e. 'founding': "all linguistic sense stands in a founded/founding relationship to a deeper 'gestural' or 'emotional' sense" (Besmer: 2007, 5).

The gestural theory was intended to illustrate three things about language. First, language is not separate from expression as both 'empiricists' and 'intellectualists' might believe (ibid., 35): the 'empiricist' holds that language is a social construct or a set of arbitrary social conventions, independent of any given act of expression; the 'intellectualist', maintaining a rigid distinction between language and thought, divorces language from the meaning and therefore makes it at best correlative to expression. Second, gesture integrates us into our environment (ibid.). Gestures such as points 'illuminate' or 'make present' objects for us, and in order to understand another's gesture we must therefore share their world. Hence, third, gesture gives us the other person – the meaning of gesture is not 'hidden', residing within another's veiled consciousness, but immediately perceived in virtue of the shared world (ibid., 36).

The gestural theory's also encounters several problems. First, whilst the meanings of spoken words could initially be those of gestures, the meanings will not remain constant and will go beyond the initial gestural meaning. For example, speech about speech is possible, but we cannot, in analogous fashion, gesture about gesturing or (or do likewise in other modes of expression, such as paint about painting). Hence, gesture and speech must be distinguished (ibid., 46). But this distinction is precisely what the gestural theory cannot admit: "...there is no fundamental difference between the various modes of expression, and no privileged position can be accorded to any of them on the alleged ground that it expresses a truth in itself" (Merleau-Ponty: 2006, 455).

Second, Merleau-Ponty writes about the institutional nature of language in *Phenomenology of Perception*: that our linguistic expression, “by the use of words already used... carries on the heritage of the past” (ibid., 456). However the gestural theory given in that book does not seem to account for the “sedimented history of linguistic meanings and... ideal objects understood as cultural beings” (Besmer: 2007, 49).

Third, in suggesting all ideal objects – linguistic meanings – are grounded in embodied gestural meaning, ideal objects are considered homogenous (Besmer: 2007, 49). However there appear to exist heterogeneous classes of ideal objects: ANGER and CARESS, for example, do seem to capture moments of our embodied experience and therefore might well be explained by the gestural theory; CARNIVAL and WEEKEND, as cultural objects, are not obviously grounded in gesture; GEOMETRY and SYNTAX, as more abstract ideal objects belonging to the realms of mathematics and computation, seem to present a formidable challenge to the gestural theory. The gestural theory therefore seems particularly hard-pressed to make sense of truth – which, as has already been pointed out in the introduction, was something which Merleau-Ponty worked on but apparently never managed to resolve.

After *Phenomenology of Perception* Merleau-Ponty turned from conceiving of language as grounded in embodied experience to conceiving of language as an institution which “establishes and re-establishes the ‘Logos’ of the cultural world” (Merleau-Ponty: 1964b, 97). A central defect with the gestural theory is that it refers to and presupposes an already constituted shared world – for us to find certain words expressive of our experience, the words must already be operative in that experience (Besmer: 2007, 45). However, before his death Merleau-Ponty seemed to move to the position that the “‘originating’ [of meaning] is not of one sole type” (Merleau-Ponty: 1968, 124), implying that whilst it is implausible to argue that *all* words have their meanings grounded in bodily states, some words are, perhaps, grounded in this way.

Grounding symbols in embodied being-in-the-world is emphasised in embodied cognition. For example, proponents of the ‘neural theory of language’ (NTL) consider that the meanings of nouns depends on the potential uses, or ‘affordances’, of their referents, e.g. the meaning of the word ‘cup’ depends on us considering the cup as something to drink from, or to use to catch a spider, etc. (Feldman and Narayanan: 2004, 385). Verb meaning, by contrast, is considered to be grounded in our bodies’ motor processes (see Bailey: 1997 and Feldman: 2008), along with the related category of aspect, i.e. the internal temporal structure of an event (Narayanan: 1997a and 1997b). In the next chapter I will focus on aspect (and, to a lesser extent, will discuss verbs). Here I focus on the category of determiners, suggesting that

they are grounded in spatial deixis. In both chapters, however, I suggest the grounding of these categories presupposes grammatical structure.

Consequently, I argue that the gestural theory is insufficient to explain the grounding of word-meaning – rather, the type of deictic gesture which grounds determiners is made possible by relational, grammatical structures. On this view, we simply are grammatical creatures. To illustrate this, the following section contrasts human abilities with animal vocalisations and ape gestures. I argue that whereas the grounding of determiners is inherently grammatical, animal communication systems lack such abstract relational structure, and that since apes develop gestural repertoires and demonstrate a sophisticated *practical* understanding of their environment, their lack of words is difficult to explain if gestural origin of word-meaning is proposed. If true, then it is the grammaticality of words that separates apes from humans, as even human infants display an ability to combine deictic gestures with object names. This interpretation relies on grammar being considered as not simply confined to structural descriptions of strings of inner linguistic symbols, but instead as something which may be extended through the body to worldly objects.

Second, I will suggest that our spatial concepts are built on this prior grammatical scaffolding. This section will discuss Heidegger's account of our primordial spatiality as founded in our dealings with equipment, and Lakoff and Johnson's contention that our primordial spatial concepts are given by our embodiment. I will suggest that our primordial spatial concepts are grounded in the 'here/yonder' and manifested in words such as 'this' and 'that'.

4.2 Vocalisations, Signs, and Words

This section contrasts human words with, first, animal vocalisations and, second, ape gestures. Animal vocalisations appear to be *functionally* referential – that is, they exhibit the following properties: production specificity; discrete structure; context independence (Evans et al.: 1993, 24). Production specificity denotes that such vocalisations are produced in response to given environmental stimuli (e.g. approaching predators or sources of food), and that production of vocalisations is “restricted to objects and events experienced in the present” (Hauser et al.: 2002, 1576). Discrete structure refers to the fact that animals display virtually no ability to combine their limited repertoire of vocalisations in order to produce new sounds expressing new meanings.⁵² Finally, context independence refers to the fact no contextual information appears to be required for listeners to interpret a given vocalisation, i.e. nothing

⁵² For this reason Cheney and Seyfarth (1997: 188) characterise animal vocalisations as “a single utterance or thought that simultaneously incorporates a subject and predicate.”

beyond the vocalisation itself is needed for listeners to know that, say, a predator is approaching. Further, “there is no evidence that calling is intentional in the sense of taking into account what other individuals believe or want” and “if the signal is referential at all, it is in the mind of the listener who can extract information about the signaller’s current context from the acoustic structure of the call alone” (ibid., 1576).

Words, by contrast, are *intentionally* referential. First, we can use them to draw another’s attention to an object, but the object does not appear to initiate a ‘speech-reflex’ where the word is automatically produced – we are not ‘forced’ to say pink upon the perception of something pink, but we might ‘choose’ to do it merely to comment upon the colour or the object that is so coloured (Pinker: 1995, 341). We also regularly employ words to refer to objects not in our present environment – we can refer to ‘that repulsive pink car we saw last week’, for example. Hence, our words are simply not production-specific.

Second, words *can* be combined and recombined into new and novel wholes – in contrast to animals’ repertoires of vocal calls, human languages exhibit discrete *infinity*. Indeed we can go further in distinguishing animal vocalisations from human words by noting that whereas the animal words are production-specific – perhaps expressing a ‘constant meaning’ – it is precisely the *opposite* in the case of words (as noted in chapter 2, there does not seem to be strict, constant link between word and meaning in language). Word meaning may vary with grammatical structure (explored further in chapter 6, below), and followers of Wittgenstein would no doubt go further by emphasising that words display little necessary consistency of meaning across the different instances of their use, and that any similarities which do exist are often best captured not by a set of necessary and sufficient criteria (environmentally specified or otherwise), but by the analogy of ‘family resemblance’, i.e. “a complicated network of similarities overlapping and crisscrossing; sometimes overall similarities, sometimes similarities of detail” (Wittgenstein: 2001, §66).⁵³

Third, contextual information – ‘pragmatics’ – *is* often required in order to comprehend linguistic utterances. Referring to ‘the apple-juice seat’ might appear bizarre in isolation but is perfectly understandable in the appropriate context (quoted in Tomasello: 2010; see also chapter 6 for a discussion of the relation between grammar and pragmatics).

It is important, however, to note that other animals “show an impressive ability to both discriminate between and generalize over human speech sounds” (Hauser et al.: 2002, 1574). The following animals have been shown capable of distinguishing between different

⁵³ Although sympathetic to the Wittgensteinian position, I should acknowledge that this is not universally accepted. Fodorian lexical atomists, for example, would no doubt contest this point. Thanks go to Professor Wolfram Hinzen for emphasising this to me.

phonemes: budgerigars (Dooling et al.: 1995); chinchillas (see Kuhl and Miller: 1975); macaques (see Kuhl and Padden: 1982) and Japanese macaques (see Sinnott et al.: 1997 and Sommers et al.: 1992); Japanese quail (Kluender et al.: 1987); zebra finches (ibid.). Meanwhile, Kluender et al. (1998), demonstrated that European starlings can, having learned prototypical cases of certain English vowels, discriminate novel instances of these vowels. Finally, experiments showed both human newborns and cotton-top tamarin monkeys can distinguish sentences from two human languages. As the experimenters put it: “This suggests that the human newborns’ tuning to certain properties of speech relies on general processes of the primate auditory system” (Ramus et al.: 2000, 288). Such studies are worth emphasising for they show animals *do* perceive and can identify patterns in the raw phonological ‘data’ of human speech; it does not seem to be the case that animals lack necessary perceptual or sensory apparatus; rather, they simply cannot grasp its linguistic significance.

Animal vocalisations are “basically genetically fixed” (Tomasello: 2010, 44). Great apes’ vocalisations are usually no exception to this⁵⁴, but their gestures *are*. Apes communicate gesturally with each other on a regular basis: some of their gestures, like their vocalisations, are genetically fixed (thus properly called ‘displays’); other gestures, however, are individually learned and “may properly be called intentional signals” (ibid., 20).⁵⁵

Unlike vocalisations, intentional signals are *not* production-specific and there exists a dissociation of signal and goal such that different gestures may be used for the same purpose and the same gesture may be employed for different communicative ends (see Tomasello et al.: 1994). The ends in question most frequently involve influencing the behaviour of others, and the gestures themselves are conventionalised abbreviations of social interactions. For example, a young ape’s hitting motions in rough and tumble play become an abbreviated ‘arm-raise’ signal for initiating that play, taking advantage of the intended recipient’s reactions to the actual hitting motion (Tomasello et al.: 1989, 43). Such gestures are *dyadic*, that is, they are an attempt to influence the recipient’s behaviour, but they do not communicate something to the recipient *about* some third entity (Tomasello: 2010, 23).

Such intentional signals cannot be considered linguistic. Whereas we are born into a (cultural) linguistic field, inheriting our words, apes are not and develop their gestural repertoire through dyadic social interaction – there appears to be no evidence for a ‘cultural repository’ of ape gestures, as gestural repertoires are subject to wide intra-group variation, there exist no systematic differences in the gestures used by different groups, and certain

⁵⁴ Bonobos, however, appear to display some sort of referential ability in their vocalisation (see below).

⁵⁵ “These intentional gestural signals often concern less emotionally charged and evolutionarily urgent social activities such as play, nursing, begging, and grooming” (Tomasello: 2010, 20).

gestures are used only by single individuals.⁵⁶ Further, once an individual's need for a gesture ceased, the gesture was no longer performed by that individual – for example, adult chimpanzees no longer employ their childhood gestures requesting breast feeding (see Tomasello et al.: 1989; 1994). By contrast, our use of words is not so tied to our bodily needs that certain words are no longer employed after a certain point in our development.

But there is a particularly interesting class of intentional signals demonstrating that apes have some grasp on others' intentional states. These are 'attention-getters' which apes use to ensure another is appropriately attentive, and such gestures are *not* widespread in the animal kingdom; it is possible they are confined to the primates or great apes (Tomasello: 2010, 27). Often, though, if the intended recipient of a gesture is not paying attention, the ape will not use an attention-getter but simply position themselves directly in front of the intended recipient, *then*, once the intended recipient has noticed them, use the gesture (see Liebal et al.: 2004b).⁵⁷

Further, if a recipient does not react to a gesture in the desired manner, the ape will use sequences of gestures in an effort to induce the desired response.⁵⁸ Such gestures are used in sequences with other intentional movements. For example, a young chimpanzee named Natasha would combine throwing things – an attention-getter – with her pout-face to request nursing (see Tomasello et al.: 1994, 144). Pollick and de Waal have also noted that bonobos are more successful in eliciting a response when they combining a facial/vocal expression (the 'attention-getter') with a gesture, than when they use gesture alone (2007, 8188).

Such sequences of signs, it must be stressed, are *not* evidence of linguistic or grammatical abilities. Whilst apes do employ sequences of signs, there appears to be no regularity to the order of the signs in their sequences – importantly, attention-getters did not precede the use of other gestures to any significant degree (Liebal et al.: 2004a, 392). As Hauser et al. summarise:

It seems relatively clear, after nearly a century of intensive research on animal communication, that no species other than humans has a comparable capacity

⁵⁶ Tomasello et al. examined the gestures employed by a group of chimpanzees in 1983, and the same group in 1987: "Of the 74 individual gestures (a single type used by a single individual) used in 1987, only 27 (36%) had also been used by that same individual in 1983. Moreover, of the 28 gesture types observed at some point during the two studies, only 6 (21%) were used by more than one individual at both time points" (1989, 39).

⁵⁷ Exactly why apes prefer to walk around is unknown at this time.

⁵⁸ Tomasello characterises apes' general communicative act as follows: "check the attention of the other > walk around as necessary > gesture > monitor the reaction of the other > repeat or use another gesture" (2010, 33).

to recombine meaningful units into an unlimited variety of larger structures, each differing systematically in meaning. (2002, 1576)

But of special interest is a subset of such attention-getters which might imply some ability for 'triadic' (i.e. referential) communication (Tomasello: 2010, 28), that is, an ability to *intentionally* draw another's attention to some object. Pika and Mitani, for example, give evidence that wild chimpanzees will scratch an area of their body to request that area be groomed, and take this act to "imply that some form of mental state attribution may be present in our closest living relatives" (2006, R192). Meanwhile Liebal et al. (2006) report orang-utans, on rare occasions, offering unwanted food to others.

Also important here is that intentional signals are often characterised by 'gaze alternation', where the gesturer alternates their gaze between their goal (e.g. some food) and the recipient of their gesture (e.g. a human who the gesturer is requesting assistance from – see Tomasello et al.: 1994). Indeed, chimpanzees raised in captivity learn to point to things for their human caretakers which they want but cannot obtain on their own – usually food. Importantly, the gesture is a point, not simply a persistent reaching, as the chimpanzees do not use the gesture when there is no one about to get the food for them (see Leavens et al.: 1998; Leavens et al.: 2005). Such pointing is flexible: given options of food, apes will point to the most desirable food and continue pointing if they receive a less desirable option (Leavens et al.: 2005); when apes see that a human requires a tool – which the ape saw being hidden earlier – to access the food, the apes will point to the tool (Call and Tomasello: 1994).

Apes also tend to look to the eyes of humans when making request, suggesting "they know that the causality/intentionality somehow emerges from behind the eyes and not just from the external limbs carrying out the desired actions" (Tomasello: 2010, 36). This awareness of intentionality is applied to both humans and conspecifics, and have been experimentally demonstrated in numerous ways: upon seeing a human peer round a barrier, chimpanzees will position themselves to do so as well (Tomasello et al.: 1999); bonobos, chimpanzees and gorillas will follow another's gaze through a window to an object, but will not do so if the window is instead an opaque barrier (orang-utans, however, exhibited few signs of being capable of this task – see Okamoto-Barth et al.: 2007); chimpanzees, orang-utans and bonobos all take into account whether a human can see their gesture when begging for food, and may also use the human's bodily orientation to decide whether the human is disposed or able to give them food (see Kaminski et al.: 2004); chimpanzees will take into account whether conspecifics, especially more dominant chimpanzees, can observe the food

which they are competing for and will consistently target food which the dominant cannot see (Hare et al.: 2000 and Hare et al.: 2001).

This awareness of intentionality is not restricted to simply following gazes – apes also seem to demonstrate an understanding of others' *purposes*: chimpanzees get agitated if someone intentionally delays passing food to them, but will be patient if the passer is making a genuine but unsuccessful effort (Call et al.: 2004, 493); chimpanzees demonstrate a capacity for “instrumental helping”, i.e. helping others achieve their goals (Warneken and Tomasello: 2006, 1302); chimpanzees will imitate actions they have just witnessed human adults attempt to perform, and will prioritise the most successful strategies which they saw demonstrated by the adults (Myowa-Yamakoshi and Matsuzawa: 2000); chimpanzees and orang-utans are able to distinguish between actions which are accidental and those which are intentional (Call and Tomasello: 1998); chimpanzees can discern between actions that are ‘forced by circumstance’ and those that are ‘free’, and will imitate those which are freely chosen, indicating that chimpanzees have some grasp on a given action’s rationality (Buttleman et al.: 2007).

Despite apes’ impressive abilities, it is important to note, first, that their awareness of intentionality is very limited compared to our own and, second, that these gestures are certainly not ‘fully’ linguistic, if only because their gestural repertoire does not seem to exhibit any sort of combinatoriality, or grammatical structure. But perhaps a more fundamental difference and a “critically important” feature of ape pointing is that it appears confined to what Tomasello calls “the imperative function” (2010, 37): Apes will not point to an object to share interest in it with another individual, and neither will they point to inform another of something the other might need/want to know⁵⁹ – by contrast words are used to do both these things, and human infants display such capacities “from very early on in ontogeny” (ibid., 38).

Turning to the apes’ understanding of others’ intentionality, it has been demonstrated that their abilities do not match those present in humans. One experiment (Tomasello, Call, and Gluckman: 1997) required the subject to identify which container concealed a reward, and they were assisted by a person who would point to, place a marker on, or show a picture of, the correct container – the ‘object-choice test’. Children between the ages of 2.5 and 3 years old who performed this task selected the correct container significantly above chance when any of the signs was used, even if the sign was new to them.⁶⁰ Apes, by contrast, did *not* perform above chance unless they had already undergone significant training in using a

⁵⁹ This also appears to be true of those apes that have had some ‘linguistic’ training (Tomasello: 2010, 38).

⁶⁰ However, their success was to varying degrees: children found pointing easiest and the picture the most difficult.

particular sign to locate food – and any previous training on one type of sign did not generalise to the new signs. Additionally, some apes which had been trained with certain signs still failed to perform above chance when those signs were used.

Hare and Tomasello (2004) performed an interesting follow-up to the object-choice task which placed the ape in competition with a human experimenter. Food was hidden under one of a selection of opaque containers, but, unlike the ape, the experimenter knew its location. To reach a container, and therefore the food, the experimenter and the ape would be required to reach through a hole for any container; however each container was out of reach of the experimenter's arm (but not the apes). When the apes saw the human experimenter attempting to reach – unsuccessfully – for a specific container, the apes understood that the experimenter was trying to reach the container hiding food. The apes chose the same container as their human competitor at above chance levels (Hare and Tomasello: 2004, 574). Tomasello and Carpenter interpret such results as indicating that apes do not construct a “joint-attentional format” with their conspecifics – that is, they cannot conceive themselves as being a part of a group/social ‘task’ – and therefore they cannot understand the communicative intentions behind a pointing gesture (2005, 110).

In this regard it is interesting to note reports of apes engaging in what appear to be group/social tasks in the wild. For example, apes engage in ‘territorial raids’ against neighbouring groups, often using lethal force to gain new territory or new mates, and, during such raids, observers report apes *gesturing* to each other *about* features of their environment (see Mitani et al.: 2010). They also display an intricate understanding of social dynamics: the alpha male will maintain his status by forming alliances and granting his allies preferential access to mates (Duffy et al.: 2007). However, as Tomasello and Carpenter emphasise, “there has never been a single [experimental] demonstration of two nonhuman primates playing complementary roles in a single collaborative interaction” (2005, 94). Perhaps, as Tomasello and Carpenter suggest, this lack of experimental evidence implies apes have no ability to establish a ‘joint-attentional frame’ in which collaborative action would take place – consequently, the apparent collaborative behaviour observed in the wild might have been misinterpreted. Alternatively, perhaps apes have no reason to engage in such collaborative efforts outside their natural environments, and the mistake has been to assume that other species can engage in the projects of *Homo sapiens* in the manner of *Homo sapiens* – after all, why would apes attempt their own collective activities when reared/put in captivity, i.e. a human environment?

In our current state of knowledge, it seems highly unlikely that we can legitimately claim to fully understand ape behaviour but, granting apes *some* proficiency at both collaborative endeavours and understanding others as intentional, perhaps an interpretation of current data can be offered which draws on the insights of phenomenology and extended cognition.

The object-choice task – in its ‘competitive’ incarnation (Hare and Tomasello: 2004) – would seem to demonstrate that apes can *perceive* others as purposive agents, as evidenced by apes’ understanding that humans were *reaching* for a container, albeit unsuccessfully. This would seem to imply that apes have an immediate understanding of environmentally-embedded bodily actions. Ratcliffe suggests that “our primary access to others [i.e. other humans] is neither a matter of theorising nor simulating but of a perceptual, bodily receptivity” (2008, 136), and this suggestion can also be extended to apes – that is, they do not need to engage in cognitive theorising/simulation regarding the mental states of other apes or humans, for their understanding of such things is *perceptual*. Such an interpretation might also receive support from those experiments (cited above) demonstrating apes’ grasp of the distinctions between actions that are ‘voluntary’ and ‘forced’, ‘intended’ and ‘accidental’, their use of bodily/facial positioning, etc. In all these cases the chimpanzees can *perceive* actions as actions, whereas involuntary/accidental movements are simply movements. In other words, there is no need to claim that chimpanzees have a natural/cultural advantage at competitive tasks. Rather, they perceive the significance of another’s action.

Given that apes do manifest an ability to use equipment⁶¹ it seems plausible to interpret apes’ points and signs (in the case of those apes that have been ‘language-trained’) to be equipment also – that is, equipment to influence the behaviour of their human carers/experimenters. Pointing, then, would seem to have practical significance but lack any theoretical or inferential structure.

Recall that pointing at (hidden) food so a human might fetch it is not all that chimpanzees can do – they can also point to (hidden) tools which the human can then use to retrieve food for them, or place a human’s hand in a trouser pocket as they know that is where the key to the food cupboard is. In other words, the ape is able to perceive the functionality of equipment (i.e. understand its appropriate use). Their understanding of this equipmental structure can be very complex, including multiple ‘levels’ and an awareness that certain pieces of equipment require humans to use them: pointing is used *in order to* direct the human to the cupboard which contains the stepladder, so the human will use the

⁶¹ For example, chimpanzees use tools to extract termites from mounds and honey from ground-dwelling bee hives (see Fay and Carroll: 1994).

cupboard door *in order to* perceive the stepladder which can be used, *by the human, in order to* reach the food.

Such an interpretation might overcome the oddity that apes can direct humans to a hidden object but, as evidenced by the cooperative object-choice test, are incapable of understanding that a human is directing *them* to a hidden object: the ape's pointing might be interpreted as directing the human to a tool's *affordances* (the food is *for* the ape, the ladder is *for* reaching the food, the cupboard is *for* opening); the human's pointing to a container might similarly be conceived as being interpreted *by the ape* as highlighting an object's affordances, *not* stating that food lies hidden behind it. Perhaps, if a container is not understood practically by the ape *as a container* – if it is an oddity devoid of practical significance – then the container will simply be one of several similar objects, alien to the ape's practices and therefore exhibiting no affordances of its own. Perhaps, the container does exhibit affordances – the apes do have an understanding of its potential practical uses – but these affordances are not naturally applicable in the current situation, so that the ape acknowledges the container but is naturally confused as it cannot understand what affordances of the container the human wishes the ape to take advantage of. Perhaps this is why, during the cooperative object-choice test, apes follow humans' pointing to the correct container but then make their selection randomly.⁶²

If this is true, there is no need to say that in the competitive object-choice task the ape saw a hand reach out and then *inferred* on this basis that the human must be reaching for food, whereas in the cooperative variant the apes saw the human pointing but then failed to make the correct inference – as if the ape, upon seeing the human's point, said “OK. There's the bucket. So what? Now where's the food?” (Tomasello: 2010, 39) Rather, there *is no act of inference*. In the competitive condition the ape was allowed to perceive the *action* of reaching, and an agent reaching just *is* an agent reaching for something (as opposed to pointlessly extending a limb – as mentioned above, apes can distinguish between purposive and non-purposive movement). In the cooperative definition, the ape can understand the human's direction of their attention to the object, but following human's gesture to a specific container, absent an act of inference, will not allow them to solve the problem for there is nothing in the perception revealing the significance of *that* container, i.e. why the human is drawing their attention to it.

⁶² This might also explain why although apes cannot succeed in the cooperative object-choice task variant discussed so far, they can make the correct decision if (instead of pointing) the experimenter picks up each container and shakes it, producing a rattling sound when they shake the container within which is hidden the food (see Call: 2004). By a rattling sound coming from one container, that container now has a new affordance given in the ape's perception.

So why do apes not (at least, in conditions of captivity) point for each other? Tomasello has argued that the key to language is “the nature of uniquely human social cognition” (2003b, 48), and because apes lack this type of social cognition (the ability to construct ‘joint-attentional frames’) that they have such trouble comprehending human “gestures designed to inform them of things helpfully” (Tomasello: 2010, 38). However the discussion above suggests another solution – points and signs are, for apes, tools for influencing the behaviour of others: “...virtually all [ape] signs are demands for something they want, usually food or tickling” (Pinker: 1995, 340). If an ape’s point draws another’s attention to an objects’ affordances, with the aim of getting the other to use the affordances of the object then this would imply that apes are pointing to tools which have practical significance for humans. But it also might imply that, under the artificial experimental conditions, when humans point to an object for an ape, the ape is uncomprehending because, for them, the object has no relevant affordances. This distinction between practical ‘know-how’ and theoretical ‘know-that’ highlights a critically important qualitative difference between human words and ape signs: ape pointing and signing is confined to the ‘imperative function’ (see Tomasello: 2010, 38). Apes appear incapable of grasping the idea that objects might be *named* – they show little if any ability to use signs as anything more than tools for achieving practical ends.⁶³ This interpretation of ape’s use of signs as tools to control their environment – specifically, the behaviour of others – appears to mesh nicely with Gauker’s reinterpretation of Savage-Rumbaugh’s work (see Gauker: 1990). Whereas Savage-Rumbaugh interpreted apes’ signs as referential, Gauker argues that the apes’ signs are better understood via a kind of ‘cause-effect analysis’ – that is, as tools which will *cause* the desired behaviour in their intended recipient.⁶⁴

⁶³ To emphasise this difference, consider what a native American Sign Language (ASL) speaker, also a member of a team attempting to train apes in ASL, said regarding the signs that the ape produced:

Every time the chimp made a sign, we were supposed to write it down in the log... They [the hearing trainers] were always complaining because my log did not show enough signs. All the hearing people turned in logs with long lists of signs. They always saw more signs than I did... I watched really carefully. The chimp’s hands were moving constantly. Maybe I missed something, but I don’t think so. I just wasn’t seeing any signs. The hearing people were logging every movement the chimp made as a sign. Every time the chimp put his finger in his mouth, they’d say ‘Oh, he’s making the sign for drink’, and they’d give him some milk... When the Chimp scratched itself, they’d record it as the sign for scratch... When [the chimps] want something, they reach. Sometimes [the trainers would] say, ‘Oh, amazing, look at that, it’s exactly like the ASL sign for give!’ It wasn’t. (quoted in Pinker: 2005, 337-8)

⁶⁴ Gauker (1990) hypothesises that human language is also best understood as a grasp of causal relations. I will not enter into a protracted critique of Gauker here, but it is perhaps worth noting in passing that he acknowledges that the creativity of language – the ability to understand and produce an infinity of sentences –

A possible exception to this might be present in the Vygotskian ‘scaffold’ effect (Clark: 1997a, 194) which seems to have been demonstrated in some chimpanzees. Experiments have been performed during which chimpanzees were shown two arrays of candy under a reversed reinforcement contingency – that is, they would *not* receive the array that they pointed to, and they would instead receive the array which they did not point to. Apes appeared incapable of selecting the smaller array (in order to receive the larger) when selecting between two arrays of candy. But, after training on the magnitudes of Arabic numerals (matching the 0 through 6 inclusive to appropriately sized arrays of objects), when the experiment involved pointing at Arabic numerals instead of candy (where the Arabic numerals corresponded to the quantity of candy received), the apes were able, without any further training, to overcome the problem presented by the reverse reinforcement contingency:

Animals were unable to maximize reward by selecting the smaller array when candies were used as array elements. When Arabic numerals were substituted for the candy arrays, all animals showed an immediate shift to a more optimal response strategy of selecting the smaller numeral, thereby receiving the larger reward. (Boysen et al.: 1996, 76)

Interestingly, however, the apes, both trained in the Arabic numerals 0 through 6 and familiar with the task, could *not* reproduce the more optimal response strategy when the candy was once again the object of choice rather than the Arabic numerals: “...over counterbalanced sessions with symbols and candy arrays, performance shifted immediately significantly from above chance with Arabic symbols to significantly below chance with candy arrays” (ibid., 84).

The results are very impressive and would seem to lend credence to Clark’s claim that “the act of labelling creates a new realm of perceptible objects upon which to target basic [learning] capacities” (Clark: 2011, 45). The points-at-symbols were *not* functioning in a similar manner to previous instances of pointing because apes were not pointing to the symbols’ represented magnitudes in an attempt to get *that* quantity of candy, but instead were pointing to one magnitude in order to get the quantity *of the other*.⁶⁵ Apes, then, seem to

is something that he cannot, at the time of writing, explain (though he hopes that it is not *inexplicable* within his conception of language as a grasp of causal relations).

⁶⁵ This suggests a ‘symbolic’ variant of the object choice test. Apes trained on the Arabic numerals 0 and 1 could be presented with a choice of two containers, one of which conceals food: the container hiding the food would be labelled ‘1’; the empty container would be labelled ‘0’. (Or, if the concept of ‘0’ is difficult to teach, it is easy to envisage another variant where the different quantities of food are concealed within containers and each container is labelled in accordance with the quantity of food that it houses.) Would symbols allow apes to overcome the problem of making the optimum decision?

display some ability to move beyond their embodied praxis to a 'higher' level of cognition – the Arabic numerals allowed them to transform the 'problem-space' which confronted them. However, this does raise the following question: why, given that following appropriate training they seem to be able to use symbols to transform a problem-space, have apes not developed symbols themselves? And why, once taught a few symbols, do they not 'get it' and extend the systems they have been taught, or develop new systems themselves? My answers to both these questions concern grammar. In the remainder of this section I will therefore make three interwoven suggestions: first, we are grammatical beings, whereas apes are not; second, only a grammatical being can have words as opposed to tools; third, the creation of linguistic symbols requires grammatical abilities.

In contrast with my first suggestion, Tomasello seems to interpret apes as having some sort of rudimentary 'proto-grammatical' ability. Because 'sign-language trained' apes occasionally pair signs for (desirable) objects with points or begging gestures, Tomasello claims:

...it would seem reasonable to suppose, as in the case of young children, that at the very least, the apes are indicating multiple things in the situation and so are expressing meanings richer than those they could have expressed with a single sign alone. We should thus credit them with at least some minimal grammatical competence, some first glimmerings on the road to human syntax. (Tomasello: 2010, 252)

Additionally:

This [use of multiple signs] might indicate that these apes have the ability to, in effect, parse a conceptual situation into two different elements, such as event and participant, that is not so different from the way humans do it. (ibid., 255)

Although this is a possible interpretation of the apes' behaviour, this does not seem to address whether the apes are expressing a single unified meaning using two signs, or whether they are simply using one sign in an effort to manipulate behaviour followed by another sign in an effort to manipulate behaviour. Indeed, the observation that apes use sequences of signs does not necessarily imply an ability for conceptual parsing, and is consistent with interpreting their use of signs as tool-use, and thus understanding their behaviour as using several of the tools available to them to effect a particular change in their environment by influencing the behaviour of another. The 'tool-use' interpretation should be strengthened by several observations.

First, a significant majority of apes' signing behaviour employed only a single sign, with instances of multiple sign use in the minority (see ibid., 251-253). Second, a large amount

of apes' sequences of signs were simply the same sign used repeatedly (ibid., 248). Third, all ape communications, even amongst 'linguistic' apes is confined to the requestive/imperative function (ibid., 256). Fourth, and most significantly, the trained apes in the studies cited by Tomasello used sequences of signs typically containing the sign for a desired object followed by a 'wildcard'. This did result in sequences which might be taken in isolation to be primitive grammatical combinations (e.g. 'ball good', 'flower there [pointing gesture]', 'toothbrush gimmie [begging gesture]', and 'Gum hurry' – see ibid., 251), however it also resulted in nonsense combinations (e.g. 'drink gum' and 'clothes eat' – see ibid., 252). Typical sequences of words from another study with another 'linguistic' ape, Nim Chimpsky, reveal similarly nonsensical productions, including: "Drink eat me Nim"; "Me gum me gum"; "Me banana you banana me you give"; "You me banana me banana you"; "Banana me me me eat"; "Give orange me give eat orange me eat orange give me eat orange give me you" (quoted in Pinker: 1995, 339-40).

The lack of *systematic* coherent combination might therefore imply there to be, in actuality, no combination at all to the sequences of apes gestures.⁶⁶ Instances which appear to be meaningful, albeit primitive, grammatical combinations are then qualitatively similar to those which are obviously not grammatical – that is, instances of apes using multiple tools in order to produce the desired practical end. On this interpretation, an ape signing 'flower' and 'there [pointing gesture]' in sequence is *not* signing 'that flower', but employing the sign for 'flower' in order to request the flower *then* using the pointing sign in order to request the flower (again). Two tools are employed, both intended to influence another's behaviour to the same practical end. There is consequently no grammatical unity in the ape's gesturing, as is obvious in many of their sequences, but, given the nature of the tools used, human observers might mistakenly interpret certain sequences as being 'grammatical' combinations – but this is because these signs have a kind of significance for us that they simply do not for apes.

The contrast between apes and humans is especially stark when compared with even very young human infants. Admittedly, human infants in their early stages of linguistic development predominantly use one word utterances. It is also frequently observed that these utterances are holophrastic. As Vygotsky puts it:

In regard to meaning... the first word of the child is a whole sentence. Semantically, the child starts from the whole, from a masterful complex, and only later begins to master the separate semantic units, the meanings of words,

⁶⁶ An important qualification here is that 'systematic combination' does not necessarily mean a fixed word order. Warlpiri, for example, is an aboriginal Australian language which allows free word order (Warlpiri grammar is marked by the use of such things as case and verbal auxiliaries – see Hale: 1983).

and to divide his formerly undifferentiated thought into those units. (Vygotsky: 1993, 219)

However, there is another important feature of infant holophrasis: such utterances are usually formed of a word *in conjunction with* a point (and often accompanied by intonational marking of motive – see Tomasello: 2010, 264). Such human pointing, unlike apes', can be imperative or declarative (though this distinction is probably too simplistic – see *ibid.*, 117; this will receive more extensive treatment in a later chapter on force). These gestures, even amongst adults, frequently convey information which would not be captured by the speaker's words taken in isolation (Oscaliskan and Goldin-Meadow: 2005, B110). It is also worth noting that pointing is not a gesture that must vary in accordance with its referent, and is therefore easier to memorise than the name of any given object (*ibid.*, B111). These considerations, I will suggest below, imply that such gestures are, in the language of extended cognition, instances of 'ecological assembly', 'distributed functional decomposition' and 'information self-structuring'.

Developmentally, a child's ability to point precedes the acquisition of their first words (at roughly 12 months of age), and the frequency of their pointing increases during language acquisition (Tomasello: 2010, 264). Further, gesture-word combinations seem to precede word-word combinations, developed at roughly 18 months of age, with the same meaning (Oscaliskan and Goldin-Meadow: 2005, B108). Whilst the frequency of gestures and the specific gestures used varies, the overall pattern of development seems to be consistent across individuals, regardless of culture or spoken language (see Capirci et al.: 1996). Hence, a reasonable hypothesis is that gesture "serves a facilitating function for language learning" (Iverson and Goldin-Meadow: 2005, 367).

My conjecture, then, is that, whilst apes are just not able to grasp grammatical relations, the developmental patterns of infants suggest that we simply *are* grammatical creatures and this infant holophrasis is an (admittedly ontogenetically highly primitive) instance of grammatical combination. Whereas apes use a point as a tool to influence another's behaviour (often displaying an intricate structure of environmentally embedded practical concerns), human points do not always seem tool-like in this manner. For humans, the indicating gesture can be differentiated from the affordances of the object. Humans can indicate an object simply to draw attention to *that* object – and this need not be for *another* person: Infants point at a given object then say the name of that object – what Oscaliskan and Goldin-Meadow refer to as 'reinforcing relations' (2005, B104). This sort of 'complementary' utterance could perhaps be interpreted as a primitive grammatical form where the point is

not communicating redundant information, but rather engaging in an act of naming where the gesture indicates an object which is then grammatically united with a 'phonetic' label.

On this account the infant's holophrasis uses pointing to deictically isolate a given object, which is usually understood practically in terms of its affordances and its place in an equipmental totality, but, through this deictic process is now understood *as* that object – and in the first instance the name and the object (and the affordances in terms of which that object is understood) appear to be inseparable:

Simple experiments show that preschool children 'explain' the names of objects by their attributes. According to them, an animal is called 'cow' because it has horns, 'calf' because its horns are still small, 'dog' because it is small and has no horns; an object is called 'car' because it is not an animal. When asked whether one could interchange the names of objects, for instance, call a cow 'ink', and ink 'cow', children will answer no, 'because ink is used for writing, and the cow gives milk.' (Vygotsky: 1993, 222)

We might ask what, according to this interpretation, the primordial meaning of this primitive grammatical form is for the child. This is very difficult – perhaps impossible – to describe accurately because the point is not translatable into deictic words. As I will argue in the next section, words such as 'this' or 'that' imply certain spatial demarcations which might not be present in the earliest combinations of point and word. The point is spatial, 'illuminating' the object or perhaps 'making it present' for us. But, the spatiality of the point is that of a primordial connection with the object-in-space – it does not demarcate an area near to me or you, and therefore should not be described as meaning 'this' or 'that'. Instead, pointing connects us with the object. When the object is named, the name – through this connection – is considered by the child to be the object's pure expression. This deictic connection primordially allows us to see the object *as* that object.

If, as Pinker has stressed⁶⁷, none of the sign-language trained apes have succeeded in acquiring grammar, then it may be the case that there exists a sharp divide between human and apes. Humans can see objects *as* those objects – in pointing to a ball and declaring 'ball', an infant is arguably seeing the ball *as* a ball, and not merely in terms of its practical affordances (as something to be kicked, sat on, thrown, etc.). Grammar appears essential to this process – as Tomasello puts it: "if I say or sign 'cat' or 'bite' these do not pick out any individual referents... without further specification" (Tomasello: 2010, 272). If the interpretation of apes' signs as tools is correct, then there seems to be a type of human

⁶⁷ "...the apes did *not* 'learn American Sign Language'. This preposterous claim is based on myth that ASL is a crude system of pantomimes and gestures rather than a full language with complex phonology, morphology, and syntax" (Pinker: 1995, 337).

experience not available to apes: apes appear bound to the realm of practical concerns, and their signs are used as tools in order to achieve their ends; humans are practical beings also, but can view the world as a world of objects to be identified *as* those objects. Human signs are thus used to allow thought *about* those objects. Humans, then, appear simply to be grammatical creatures. Apes do not seem to share this trait; hence apes' signs are restricted to the imperative function.

One possible objection to this view is to question how infant holophrasis may be grammatical as *by definition* a holophrase is a single word or utterance which expresses the thought of an entire sentence. This would be correct if language is considered absent prior to use of words (a completely externalist view), or if grammar is considered an encapsulated mental module (a Fodorian view of modularity) divorced from our experience. The former implies that without words we have no language, and absent sets of multiple words we have no grammar. The latter implies that meaning and gesture are irrelevant to grammar, which acts as an interface between internal meaning and external form. In chapter 2 I suggested that there are problems with both these conceptions, but did not argue for any alternative. The alternative – hinted at in chapter 3 and to be more fully developed in the sixth chapter ('the Schematism') – is to consider the action of pointing to be imbued with grammatical structure. What later becomes a phrase consisting of a determiner and a noun is initially a point to an object: the determiner is grounded in the point; the noun is grounded in experience of the object; both the phrase and the pointing-at-an-object require a relational structure which is provided by grammar. Hence, we are grammatical creatures, with the arrival of pointing marking the ontogenesis of a grammatical mind which, in virtue of its grammar, is capable of internalising the symbols of its environment to ascend to higher and more sophisticated thoughts. Language therefore seems to be a uniquely human mode of our being-in-the-world, where grammatical structure embodies the chiasm of consciousness and world.

If the above is correct, the question is now: why point at all? Why is the grammatical union of point, name, and object not originally a purely internal process, implemented when we have seen the object and mentally marked its location in space, from which we can proceed to give the object its name? Ideas from embodied cognition, I suggest, can be invoked to explain the benefits of pointing. The explanation will revolve around the following idea: "Deictic pointing allows an agent to exploit the world as external storage" (Clark: 2011, 21).

Before discussing the case of infant holophrasis, consider the following experiment by Ballard et al. (1997): subjects were required to arrange a series of coloured blocks on a monitor according to a set pattern (the 'block-copying task'). Each subject's display was

divided into three areas: the 'model', in which set pattern was demonstrated; the 'resource', where the blocks that the subjects were to rearrange were placed randomly; the 'workspace', in which the subjects were to rearrange the blocks according to the pattern demonstrated by the model. An algorithm for solving this problem might conceivably take the form of: look at a particular block in the model; memorise that block's colour and location in the model; look at the resource; take a block of the corresponding colour from the resource; position the block from the resource in the workspace at the memorised location (from the model). However, subjects did not produce this pattern of behaviour. Instead, subjects looked multiple times at the model during the movement of each block. Interestingly, subjects did not notice when the colours of the blocks were changed during their eyes' saccadic movements during the task (ibid., 733).

This suggests that, even when repeated saccades are made to the same area, very minimal information is committed to memory – with perception providing the relevant information to the task on a 'just-in-time' basis (Clark: 2011, 12). The intertwining of conceptual and perceptual processes thought by the experimenters to be for reasons of "computational economy" – that is, it is easier to use the world itself than commit aspects of the world to memory then access them throughout the task (Ballard et al.: 1997, 724).

Ballard et al.'s block-copying task illustrates two of the principles of embodied cognition alluded to above. First, ecological assembly: the organism assembles the most efficient resources available to it at any given time when confronted by a given problem, i.e. regularly *looking at* the position/colour of a given block instead of committing this information to memory (Clark: 2011, 13). Second, distributed functional decomposition: perception, in the experiment, is seen not as building a "problem-sufficient model" for an internal reasoning process to operate on, but instead is seen as a "constantly available channel" whereby the information available in the world is accessed on a 'just-in-time' basis (ibid., 14). In the realisation of both of these principles, deictic 'pointing' – in the form of ocular 'fixation' – has a crucial role: "subjects use fixation as a deictic pointing device to serialize the task and allow incremental access to the immediately task-relevant information" (Ballard et al.: 1997, 733).

Deictic pointing has a similar role, I suggest, as the determiner in the grammar of infant holophrasis. Pointing is a cognitively efficient means of identifying the object being named, both by the subject for themselves and for others. It adheres to the principle of ecological assembly in that the point serves to identify an area of the world without the necessity of long-term memory use. It demonstrates distributed functional decomposition in that the embodied act serves as the crucial spatial indicator in the grammatical structure,

thereby identifying the object to be bound with its name in the mind of the child *without* the necessity of a deictic word. Further, assuming that the child has not yet acquired words with deictic functions, an adult's pointing serves to identify for the child the object which the adult is referring to, arguably being what is necessary for the child in learning the object's name in the absence of other spatial indicators.

The point therefore serves as a kind of Vygotskian 'scaffold', which allows the meaning of words to be established on the basis of a deictic indication. Absent this scaffold, acquisition of meaningful symbols would be made far more difficult: If the relational structure requires at least two parts, but an object-word can only be grasped in virtue of the deictic word, then, for an agent with no words, how is the meaning of *any* word to be learned? Absent a deictic word, a solution might be to use an embodied deictic *point*, which, unlike deictic words, requires simply perception of the point and no interpretation beyond this. The point makes clear the object of experience which its correlated noun refers to. It is for this reason that I suggest both that having words – as opposed to simply tools – requires grammar and that only a grammatical being can have words. Regarding the former claim, words are not restricted to functional uses (such as ape gestures appear to be) but can instead have their meanings altered via participation in grammatical structure. We can use names to refer to objects only if their names are further specified by a deictic determiner. Regarding the later claim, apes might be trained to use certain signs as tools – but as they are not grammatical beings they simply cannot use their signs as words. Words, on this account, are created grammatically and used *as* words only by grammatical beings.

Further, an acquired word, being "a perceptually simple" item, "effectively freezes the concept into a sort of cognitive building block" once the word is internalised – and this building block "can then be treated as a simple baseline feature for future episodes of thought, learning and search" (Clark: 2001, 144). Or, put differently, the newly acquired words themselves become part of the mental scaffold, allowing even more sophisticated thoughts to occur: "we coin new words and labels to concretise regularities that we could only originally conceptualise as a result of a backdrop of other words and labels" (ibid., 145).

In summary, language might be said to be founded in but irreducible to our embodied being-in-the-world. There is a type of human experience which moves beyond objects' practical affordances to the object *as* that object, seen in the ontogenetically primitive form of infant holophrasis. Such experience might be beyond non-grammatical beings, precisely because absent grammar it would very difficult to provide the deictic specification of the

object that is named. If this suggestion has merit, it would explain why apes, when gesturing toward an object, are restricted to the imperative function.

4.3 Primordial Spatial Concepts

Heidegger's phenomenological analysis of spatiality emphasised that we are not located at an arbitrary point in Cartesian space from which we then identify our location – the world “is not present-at-hand in space” (Heidegger: 2006, H101). Rather, we are always in an environment with which we are more or less familiar (Blattner: 2006a, 75), and the spatiality of the objects in our environment is founded in our being-in-the-world, that is, objects in our environment are encountered ready-to-hand and this is the ‘point of departure’ for an explanation of the way the world is “spatially determined” (Heidegger: 2006, H102).

Equipment, as ready-to-hand, has immediate practical significance for us (see chapter 1). Because of this primacy of our practical concerns, the spatiality of equipment is not that of abstract shapes and dimensions, but whether the equipment is suitably located for our purposes (Inwood: 2000, 34). Equipment should be positioned in suitable locations, and these locations ‘define themselves’ as being the place of their equipment (Heidegger: 2006, H102). The study, for example, is defined by the presence of the desk and the books, which must in turn be positioned appropriately *within* the study. Books, for example, have their place on top of the desk or on the shelves in the study, as opposed to – at least, in most circumstances – being placed in the kitchen inside saucepans or kettles. Equally, equipment must be positioned correctly – if the study contains an upside down desk, the desk is precisely that: upside down.

When we are engaged in our practical dealings with the world, equipment is not only characterised by its proper place, but also has “the character of *closeness*” (ibid., H102). Closeness is not to be understood in terms of the present-at-hand measurement of distance between two spatial locations, but instead in terms of the ease with which we can manipulate and use any given piece of equipment. For example, phenomenologically, the ‘closest’ thing to us might be a parked car despite that, ‘objectively’, the thing that is the shortest distance from us might be the road beneath our feet. Both *what* is ‘close’ and *how close* each entity is, therefore also gets established by “the circumspection of concern” (ibid., H102).

Because of this structure of our being-in-the-world, our familiarity with our environment necessarily involves a ‘here’ – to mark our location – and ‘yonder’/‘over there’ – which marks the location of the equipment – which requires the basic sense of location described above:

...the place is a definite 'there' or 'yonder' of an item of equipment which *belong somewhere*. Its belonging-somewhere at the time corresponds to the equipmental character of what is ready-to-hand; that is, it corresponds to the belonging-to, which the ready-to-hand has towards a totality of equipment in accordance with its involvements. (ibid., H103)

Our primordial awareness of space is therefore bound to the objects of our environment – 'above' is what is on the ceiling, 'below' is what is on the floor, 'behind' is what is at the door (ibid., H103). Consequently:

Dasein understands its 'here' in terms of its 'environmental' yonder... Dasein, in accord with its spatiality, is proximally never here but yonder; from this 'yonder' it comes back to its 'here'; and it comes back to its 'here' only in the way in which it interprets its concerned Being-towards in terms of what is ready-to-hand yonder. (ibid., H107)

It is only on the basis of this primordial spatiality that "space itself becomes accessible for cognition" (ibid., H111), that is, made available as present-at-hand and incarnated in words such as 'yard' or phrases such as 'cubic metre'. By contrast, phrases such as 'a long haul' and 'a stone's throw', whilst "impossibly vague" from the perspective of quantifiable distance (Watt: 2011, 50), are revealing in that they show "the 'remoteness' here estimated belongs to some entity to which one goes with concerned circumspection" (ibid., H106). In other words, our primordial spatial concepts appear to be founded in our practical dealings with entities.

Another aspect of our spatiality is our embodiment. Merleau-Ponty wrote that "far from my body's being for me no more than a fragment of space, there would be no space at all for me if I had no body" (Merleau-Ponty: 2006, 117). As noted in the chapter 1, our body is first and foremost a lived body, the locus of our practical concerns. Its spatiality is therefore not a "*spatiality of position*" but a "*spatiality of situation*" (ibid., 115), and therefore, we must be an embodied agent in order to have the manner of spatial existence identified by Heidegger.

From the perspective of cognitive science, embodiment is integral to Lakoff and Johnson's accounts of metaphor and spatial concepts. Metaphor for Lakoff and Johnson is "a systematic conceptual mapping from one conceptual domain (the source) onto another (the target)" to which embodiment is integral as metaphor allows "sensory-motor reasoning to apply to subjective judgements" (Lakoff: 2003, 62). Hence, this is a claim that certain concepts are metaphorically grounded in other concepts, enabling us to understand one thing in terms of another – how, for example, we understand 'argument' as 'warfare', using statements such as the following: Your claims are *indefensible*; He *attacked every weak point* in my argument; His criticisms were *right on target*; I *demolished* his argument (Lakoff and Johnson: 2003, 4).

Lakoff and Johnson acknowledge, however, that our understanding cannot be ‘metaphor all the way down’ – that is, we cannot understand *everything* in terms of metaphor, as each metaphor would entail another metaphor through which it is understood, and would thus entail an infinite regress. Therefore, there must exist some concepts *not* themselves derived from other concepts. Such concepts, Lakoff and Johnson argue, are those arising from our embodied experience, e.g. ‘UP’:

Our spatial concept UP arises out of our spatial experience. We have bodies and we stand erect. Almost every movement we make involves a motor program that either changes our up-down orientation, maintains it, presupposes it, or takes it into account in some way. Our constant physical activity in the world, even when we sleep, makes an up-down orientation in our motor programs and everyday functioning might make one think that there could be no alternative to this orientational concept. (ibid., 56)

Hence, when learning English, we must understand that the word ‘up’ designates the concept ‘UP’ “but the concept itself needs, as it were, no further introduction” (Shapiro: 2011, 88). Similarly, according to Lakoff and Johnson, concepts such as FRONT and BACK are grounded in ‘bodily projection’ (1999, 34) – since we use the front of our bodies to engage with the world, we tend to refer to the side of objects we engage with as the ‘front’ (the front of a television, for example). This is more apparent in languages such as Mixtec where body-part terms are more explicitly used to denote spatial locations – for example, ‘head’ is used to denote the top of an object and ‘face’ can be used to mark ‘energy-goals’ (Brugman: 1985; examples taken from ibid., *italics mine*):

Hiyaa-oe sini-yuku
Be+located+3sg.m. *head*-hill
‘He is on top of the hill’

Ni-ndeci n-saa shihi-yunu
Perfv.-fly one bird *head*-tree
‘The bird flew over the tree’

Ni-ha a-ri n kiti nuu-sc e-ro
Perfv.pass-1sg one horse *face*-son-2sg
‘I gave a horse to your son’

Lakoff and Johnson proceed to give the following thought experiment: “Imagine a spherical being living outside any gravitational field, with no knowledge or imagination of any other kind of experience. What could UP possibly mean to such a being?” (Lakoff and Johnson: 2003, 57) Lakoff and Johnson’s point appears to be that many of our fundamental concepts

would be inaccessible to such a being as it is neither embodied in a similar manner to ourselves nor does it reside within a similar environment.

It seems doubtful, though, that *all* our spatial concepts depend on us having the bodies that we do.⁶⁸ As Shapiro (2011, 89) argues, although it seems plausible to assume a spherical being (outside a gravitational field) might not develop the concepts of FRONT and BACK from their own body, it does not seem at all implausible to assume such a being *could* get such concepts from other objects. In the preceding discussion of Heidegger's account of spatiality, it was noted that objects in our environment have immediate significance due to our primordial, practical understanding: equipment is equipment in virtue of having functional, 'in-order-to' assignments (see Heidegger: 2006, H68). Equipment must be used in a certain way for the equipment to function effectively, and this implies a spatial dimension to its use: we drive cars *forwards* because that is how cars function effectively – reversing everywhere, or attempting to rock the car and thereby roll it sideways down the road, would not enable the equipment to function as an effective 'in-order-to'. Hence, assuming Lakoff and Johnson's spherical beings possessed equipment, it does not seem unreasonable to assume they could acquire the concepts of FRONT, BACK and/or UP from the use and structure of their equipment.

Irrespective, from the perspective of this thesis, the question is 'does grammar play a role in the genesis of spatial concepts'? The embodied being-in-the-world described so far seems, in principle, to be the sort that might also be shared by apes and other creatures. As Heidegger pointed out, primordially we understand our 'here' in terms of our environmental 'yonder' – we understand our own location relative to significance objects in our environments. But ape gestures, it was argued in the previous section, are also employed as tools used to influence another's behaviour, and these gestures seem to demonstrate the primordial spatiality described by Heidegger: apes point at objects which they desire in order that others might bring the object to them; apes point at tools which can be used in order to retrieve the objects; apes point at the tool's location in order that the tool may be retrieved; apes point or direct attention to an area of themselves if they want scratching, etc. In each

⁶⁸ Shapiro does attribute this position – that certain concepts arising from our morphology are *exclusive* to morphologically similar/identical beings – to Lakoff and Johnson (see Shapiro: 2011, 89). But it is unclear that Lakoff and Johnson hold such a strong view. First, Lakoff and Johnson also discuss how the concept of 'IN' is generated from a 'container schema' – that is, a schema having the structure of an inside, a boundary, and an outside (Lakoff and Johnson: 1999, 32) but do not seem to suggest that this arises from the nature of our own bodies as having an inside and an outside. Second, whilst it is true that Lakoff and Johnson *do* talk of 'bodily projections' shaping our conceptual structure, they also seem to acknowledge the possibility of 'externally based [systems of] relations', e.g. 'to the north of', which are not obviously so dependent on the body (*ibid.*, 33).

case the gesture appears to manifest the primordial spatiality, founded in our practical concerns, of the ‘yonder’ of the equipment and the consequent ‘here’ of the agent.

This primordial spatiality, however, does not necessarily seem to be *conceptual*. Both the phenomenological and the extended cognition tradition tend to prefer ecological accounts of behaviour (see introduction). Gibsonian psychology, for example, explains movement in terms of keeping certain structural elements of perception invariant (thereby contesting the need for elaborate internal mapping). Hence, there appears to be little reason to assume that the concept UP is *required* for a creature to be able to stand up or look up in the air – rather, in line with ecological theories of perception and action, the ability of a monkey, for example, to track the overhead flight of a bird can be given an ecological explanation in terms of keeping the elements of the bird-part of ambient optic array as an invariant in the monkey’s field of vision. Equally, the apes’ gestures observed in the preceding section, despite manifesting primordial, practical spatial qualities, nonetheless do not necessarily seem to demonstrate any spatial concepts.

This returns us to the question of the nature of the gestures of infants. In the previous section it was argued that the primordial meaning of the point is not ‘translatable’ into words, as words will carry spatial connotations not present in the initial point: ‘this’ and ‘that’ tend to imply objects far from us and objects close to us respectively, and have therefore given a rudimentary spatial demarcation absent from the primordial spatiality of the child’s point. Such deictic gestures were interpreted as integral to the act of naming, with the gesture ‘illuminating’ or ‘making present’ the object to be named. Deictic gestures increase during language acquisition becoming very common in combinations with other words, despite deictic *words* being very rare. Capirci et al. interpret this as being because deictic words impose greater demands on cognitive resources than deictic gestures, as the latter “are more directly linked to reality than deictic words” (1996, 669 – see also discussion of the ‘block-copying’ task above and in Ballard et al.: 1997). Capirci et al. further observe that deictic words tend to encode more complex conceptual distinctions (e.g. demonstrative, locative, number, gender, etc. – see 1996, 669). Just as the previous section suggested that the deictic points served to make present the object and thereby allow it to be named, the same sort of suggestion can be made again when accounting for the origin of our primordial spatial concepts (i.e. the concepts which precede ‘objective’ units of measurement). The role of a name can then be to assist in identifying an object in the environment which, given its spatial relation to the agent and any other agents, serve to identify the meaning of deictic words. ‘This’, for example, can be understood in terms of what the word is being used to indicate

(given by the following noun), and the indicated objects' location relative to the agents in the environment.⁶⁹ In an example of the "deeply iterative" process described by Clark (2001, 145), the name is therefore the "stable structure to which subsequent thinkings attach" (ibid., 147) – in this case, the name serves as the scaffold which allows acquisition of a primordial spatial concept.

Such deictic words appear to be more primordial than phrases such as 'a stone's throw' and 'a long haul'. Such phrases seem built on the task of knowing the distance between, for example, *this* rock and *that* tree, and it is on the basis of these primordial deictic words that the phases are established. At this point it is worth returning to Heidegger and noting that there is no clear cut distinction between the spectatorial standpoint of the present-at-hand and the practical standpoint of the ready-to-hand. Heidegger, speaking of closeness, does say that the "distances of things present-at-hand do not coincide with the remoteness and closeness of what is ready-to-hand within-the-world" (Heidegger: 2006, H106), which might suggest a rigid separation. However, later on Heidegger qualifies: "The spatiality of what we proximally encounter in circumspection can become a theme for circumspection itself, as well as a task for calculation and measurement, as in building and surveying" (ibid., H111). In other words, certain projects – for example, those of engineers – will require more precise measurements that are also those of the spectatorial standpoint of the present-at-hand, but such measurements will not be used in a purely observational sense, but instead as an integral part of practical activity.

Once the primordial concepts of space – 'this' and 'that', 'here' and 'there', etc. – show the need for 'spatial units' – 'a stone's throw', 'a long haul', 'a kilometre', etc. – in the projects of the sort described above, the spatial units themselves can be developed. Systems of units of measurement are often based upon bodily projections, and, as Bichakjian points out, we have tended to replace such body-based systems with more abstract, 'conceptually devised' systems:

The units of measurement provide a clear illustration [of bodily projection and the shift to abstract units of measurement]. The ancestral ones were generally based on the dimension of body parts – they were literally embodied: The inch was the standard width of the thumb, the foot the standard length of the eponymous organ; the Egyptian cubit represented the length of the forearm, and the yard that of the extended arm. With notable exceptions, these anthropomorphic units of measurement, moulded on the perception of the

⁶⁹ This is obviously not to claim that 'this' and 'that' are the only means of such spatial demarcation – Japanese, for example, uses 'kore', 'sore', and 'are' which can roughly be translated as 'this' (i.e. an object near to me), 'that [near you]' (i.e. an object close to you), and 'that [over there]' (i.e. an object far from both of us) respectively.

outside world, have been replaced with the conceptually devised metric system, which has considerable selective advantages. (Bichakjian: 2012, 249)

Bichakjian, oddly, places no explicit emphasis on the syntax of measurement systems (neither does he explicitly exclude it), and it is worth noting that placing emphasis on the selective advantages of the *unit* of measurement seems mistaken. The selective advantages of the metric system do not reside in its choice of unit – the metre – but in the system’s ‘base-10’ structure. Hence, Bichakjian’s theory should be modified to read that it is when measurement abandons a syntax derived from ratios of standard units of bodily lengths, and instead adopts a conceptually-standardised syntax that the selective advantage occurs – the unit of measurement itself, however, seems irrelevant to any considerations of ‘selective advantage’.

Grammar appears critical to the development of both the initial spatial units and the initial spatial measurement systems. Initial spatial units – ‘a stones throw’ or ‘a long haul’ – are built on grammatical formations drawing on spatial properties of an action: the determiner ‘a’ serves a crucial function of implying the possibility of multiple units (we could not talk about ‘the stone’s throws’ as a system of units of measurement, though we could speak of ‘the stone’s throw’ to denote the unit itself). More interestingly, spatial terms based on bodily projections also seem to require grammar in order to ‘force’ the meaning of the word to adapt its new usage. Using an example inspired by Mixtec (above), in a phrase denoting spatial location such as ‘head of the hill’, the word ‘head’ occurs within a grammatical structure where its relation to the phrase ‘of the hill’ is such that the former is interpreted as *a part of* the latter. As Lakoff and Johnson (1999) rightly point out, the interpretation is metaphorical (hills do not have biological heads). But the metaphorical interpretation is *guided* by the grammatical structure. Because Lakoff and Johnson consider cognitive metaphor a mapping from one cognitive domain to another, it is unclear that we can state apodictically (and a priori) that cognitive metaphor depends on language and hence that non-grammatical creatures cannot perform such mappings. However, given grammar’s role in relating ‘head’ and ‘hill’, it is perhaps not far-fetched to suggest that our metaphorical understanding is structured by grammar.

Finally, grammar seems required for basic spatial concepts founded in embodied experience. If ecological accounts of behaviour are correct, and concepts need not be invoked to explain our embodied being-in-the-world, then although spatial concepts are grounded in experience, the formation of the concepts themselves is guided by grammatical unity based on scaffolding provided by names for objects and actions. The word ‘up’, for example, would seem to require participation in grammatical wholes in order to gain meaning: ‘up’ alone has

nothing more than a vague meaning; 'up the stairs' and 'up there' imbue 'up' with a sense of aboveness; 'up the river' imbues 'up' with a different sense based on the affordances of flow of the river. The existence of these different meanings of 'up' does not imply the existence of many different correlative concepts of UP, but rather that the senses of 'up' are present in experience in many ways "and so gives rise to many different metaphors" (Lakoff and Johnson: 2003, 14). However, *which* sense of up is appropriate is understood in terms of its relation to the other words – 'up the stairs' and 'up the river' give two different spatial meanings, and the appropriate spatial meaning in each case is given by the affordances of the objects expressed by the object words (a scaffold) on the basis of which the spatial concept can be formulated.

5. Verbs, Aspect, and Executing Schemas

Comrie defines ‘aspect’ as “different ways of viewing the internal temporal constituency of a situation” (Comrie: 1976, §0.1). Aspect and tense are attached to verbs and, although both categories are temporal, aspect contrasts with tense in that the latter is deictic, i.e. it takes an *external* perspective and locates any given event in time with reference to the present or another ‘time-point’, whereas the former is not deictic, instead being concerned with the event’s *internal* temporal structure. Also important to this event-internal temporal structure is Aktionsart – whereas aspect and tense are grammatical, Aktionsart is lexical, being inherent to the verb itself (ibid., §0.2). Just as in the previous chapter I argued that determiners are grounded in our embodied being-in-the-world, in this chapter I follow Narayanan (1997a and 1997b) in maintaining that aspectual meaning is grounded in our embodied ‘motor processes’ (which might be formulated in the language of biological control theory as ‘executing schemas’, or ‘x-schemas’). Additionally, like the previous chapter, I suggest that this grounding is possible in virtue of grammatical relations.

The grounding of aspect in our motor processes, and extension via metaphorical mappings, supports Heidegger’s claim that we are not primordially aware of time as a series of contentless moments but rather that our awareness of temporality is in virtue of our praxis. However I contest an additional claim of Heidegger’s – that discourse is grounded in originary temporality – is problematic: the grounding in motor processes implies that aspect is grounded in world time, not originary temporality. Heidegger’s terminology is elucidated in the first section of this chapter, where I briefly outline Husserl’s theory of ‘time-consciousness’ and then discuss Heidegger’s appropriation of some of Husserl’s insights. I then explain Heidegger’s notions of ‘world time’ and ‘originary temporality’, and identify four claims which Heidegger makes in a passage on grammar in *Being and Time* (Heidegger: 2006, H349): first, that the temporal phenomena of language are grounded in the structure of concern; second, that the ‘ordinary’ (Husserlian) conception of time cannot explain the grounding of temporal phenomena of language; third, that the relation between being and truth be cast in terms of temporality; fourth, that an account of concept-formation can only be intelligible in terms of the temporality of discourse. The first two of Heidegger’s claims will be the themes of subsequent sections, where the verbs and aspect are argued to be grounded in our embodied motor processes. (The third and fourth will be the themes of the next two chapters which turn to assertions and truth respectively.)

The subsequent two sections review evidence concerning the grounding of verbs and their ‘inherent’ temporality, or ‘Aktionsart’, respectively. I review work from the ‘neural theory of language’ which postulates that the verbal semantics is grounded in parametrised x-

schemas (Feldman: 2008, 231; see also Lakoff 2003 and Lakoff and Johnson: 1999), and also cite some evidence of this from psychology and neuroscience to this effect. The fourth section turns to aspect, initially reviewing studies of the psychological effects of aspect, noting that the progressive form appear to involve assumption of an ‘internal’ perspective on an event, and then referencing how gestural patterns seem to vary based on aspect and Aktionsart. I then discuss Narayanan’s account (1997a and 1997b) of the grounding of aspectual structure in “sensorimotor primitives” (Narayanan: 1997b). Narayanan describes a computational model of verbal aspect implemented on a Petri net, where specific activation states in two kinds of ‘executing schemas’ (‘x-schemas’) responsible for motor control – ‘process primitives’ and ‘controllers’ – are dynamically bound with a resulting meaning. Process primitives are the x-schemas for certain actions whereas controllers are x-schemas which capture control generalisations (e.g. ‘enabling’, ‘inception’, ‘in-process’, ‘completion’, ‘suspension’, ‘resumption’, etc.). Aspectual modifiers in language are hypothesised to activate a given controller, thereby allowing certain inferences by the hearer, given the same underlying process primitives (Narayanan: 1997a; 1997b; see also Feldman: 2008): *“Aspectual expressions are linguistic devices referring to... [x-schema] generalisations that recur in process monitoring and control (such as inception, interruption, termination, iteration, enabling completion, force, and effort)”* (Narayanan: 1997a, 94). Heidegger’s first two claims regarding the grounding of the temporal phenomena of language are assessed in light of grounding of aspect in the generalised x-schemas. I argue that although Heidegger is correct to consider the (Husserlian) ‘ordinary’ conception of time is insufficient to ground the temporal phenomena of language, it does not seem correct to say that aspect is grounded in ordinary temporality – rather it would seem to be grounded in ‘world-time’.

The final section suggests that it is grammatical relations which make possible the grounding of the functional units such as ‘-ing’ used in grammatical aspect, and that these units function as ‘cognitive building blocks’ which may be related to other words in order to go beyond the meanings given in experience. This would imply that the functional units of aspect constitute the controller x-schema, rather than being mapped to it. Modification of ‘inner temporal constituency’ via grammatical aspect is taken up more fully in the next chapter, where it plays a central role in the accounting for how assertion and world may be brought into coincidence.

5.1 Husserl and Heidegger on Time

In *Ideas* Husserl outlined a “completely delimited sphere of problems... of exceptional difficulty” – that is, the phenomenological analysis of time (1983, §81). As Husserl makes clear,

his concern is not with transcendent, 'objective' time (or "cosmic time" – see *ibid.*), but rather "that [immanent] time which, by virtue of its essence belongs to the mental processes as *mental processes*" (*ibid. italics mine*). In other words, Husserl is concerned with the essential temporal properties of consciousness, or the "temporality of experience" (Gallagher and Zahavi: 2010, 72). To this end, he employs the epoché to ensure "the complete exclusion of all transcending propositions concerning what exists" and to focus instead on "appearing time, appearing duration, as appearing" (Husserl: 1991, §1).

Husserl's principal claim is that perception of temporally extended objects – whether cars or melodies – and, in particular, their successions and changes would be impossible if experience consisted in a series of discrete 'now-slices'; if "the stream of consciousness itself was a series of unconnected points of experiencing" (Gallagher and Zahavi: 2010, 75). Visual perception occurring in discrete 'slices' is in fact a symptom of motion agnosia, which occurs following damage in the medial temporal cortex – patient L.M. reported "loss of movement in all three dimensions" impeding her ability to, say, pour a cup of tea as "the fluid appeared to be frozen, like a glacier... she could not stop pouring at the right time since she was unable to perceive the movement in the cup... when the fluid rose" (Zihl et al.: 1983, 315). Our normal modes of experience stand in stark contrast to perception of a series of discrete now-slices. We perceive a continuous flow which is 'thick' with both the past and the future (Dorstall: 2006, 125). Husserl introduces three technical terms in order to account for the structure of our time-consciousness: the 'primal-impression'; 'retentions'; 'protentions'.

'Enduring' objects are said by Husserl to begin with a 'primal impression', and then pass over into 'retention'. Retentions are not memories – that is, *re*-presentations of a particular perception – but are moments of the past still perceived in the present: "One speaks of the dying-away, the fading, and so on, of the contents of sensation when perception proper passes over into retention" (Husserl: 1991, §12). Retention is therefore "consciousness of *what has just been*" (*ibid.*). The perceived primal impression continuously changes, and at each moment a given primal impression will "pass over" into retention (*ibid.*, §11). Each now phase is therefore "conceivable... as the limit of a continuity of retentions" in that each contains a continuum of fading retentions, and conversely each retention is "conceivable only as a point belonging to such a continuum" (*ibid.*, §13). In addition to the "trails of retentions" of what is past, now-phases also include a "horizon of protentions" (*ibid.*, 118), which function as a kind of anticipation of what is to come in future and may cause surprise if they are not fulfilled – if, for example, a melody cuts out before coming to its end.

This tripartite account, elaborated in Husserl's *Phenomenology of Internal Time-Consciousness*, was published in 1928 despite being comprised of lectures from several decades earlier. Although the manuscript was edited by Heidegger, it was compiled by Stein who would also compile a second series of Husserl's manuscripts on time known as the 'Bernau' or 'L' manuscripts, written in the early 1920s. When Ingarden told Husserl in 1927 how important the *Phenomenology of Inner Time Consciousness* was Husserl replied that he had something far more important to show Ingarden: "...five to six hundred pages of short-hand manuscript... These were in fact the Bernau [L-]manuscripts on time-constituting consciousness and the problem of individuation – the most difficult problems in all phenomenology, as Ingarden put it" (Bruzina: 2004, 14). Husserl tasked his research assistant – Fink – with preparing the Bernau manuscripts, but Fink became more than an assistant, and through conversations with Fink, Husserl saw the need for revisiting time again. Husserl therefore produced another set of manuscripts – the 'C' manuscripts – "which constitute a more radical stage of inquiry" (ibid., 31). As Husserl's position matured he moved from considering the transcendental ego, as 'absolute', as the constituting source/spring of time, to conceiving of time itself as *prior to* and the *source from which* subject and object emerge (Dorstall: 2006, 127-8; see also Bruzina: 2004 and Mohanty: 2006). As Dorstall notes, this position is problematic for Husserl's neo-Cartesianism, as 'time' is now neither 'inner' nor a function of consciousness (Dorstall: 2006, 129).

Husserl's account of time-consciousness was praised by Heidegger (who was also the nominal editor of Husserl's *Phenomenology of Internal Time Consciousness*): "...it was Husserl's service to have seen these phenomena for the first time, with the aid of the intentional structure" (Heidegger: 1992b, 204). Heidegger, like the later Husserl (Dorstall: 2006, 144), conceives of time as prior to the subject/object divide, writing that "*Dasein itself... is time*" (Heidegger: 1992a, 197) and that the "constitution" of Dasein is possible "only on the basis of temporality" (Heidegger: 2006, H367). As Heidegger summarises: "Temporality temporalises" (ibid., H328).

Husserl's account of time-consciousness was preserved within the context of Heidegger's own work (see Dorstall: 2006, 135; Blattner: 1999, 191). Arguably, the Husserlian account appears within Heidegger's work as the notion of 'disengaged temporality' (Blattner: 1999, 111), which is derivative of more fundamental forms of temporality – specifically, 'world time' and, in turn, 'originary temporality'. Both 'world-time' and 'originary temporality' are both forms of time related to our practical concerns. Originary temporality is "a manifold of nonsuccessive phenomena" (ibid., 26) which must be invoked to understand our own

temporal structure. By contrast, world-time is “the sequence of Nows that are spanned, dated, public, and significant” (ibid., 136). The features of the ‘Nows’ that comprise world-time (datedness, spannedness, significance, and publicity) are all modified versions of features comprising originary temporality, and the modification in question is the imposition of sequentiality: “That is, if the relevant features of originary temporality are modified by way of the imposition of sequentiality, the conceptual yield is a sequence of world-time Nows” (ibid., 177).

This should be clarified: Our practical concerns often dictate how time is understood and divided – we think of certain times as being for certain activities. Certain times are conceived as *for* reading, or *for* cooking, or *for* typing. Whilst reading I might notice that I have lost track of time – that now it is actually time for cooking – and so act accordingly. Each now is ‘spanned’ in the sense of being a ‘thick’ or “durative” present (ibid., 140). Each now is ‘dated’ in the sense that our tasks are ordered or arranged in time. Each now is significant precisely because our tasks are significant – we generally do not experience “abstract, contentless moments or Nows that must have an interpretation subsequently added to them” (ibid., 132). Each now is ‘public’ as we can refer to “now” in conversation and be understood by others, despite that we might be engaged in different tasks at any given moment and therefore might each be involved in differing ‘nows’ – Heidegger claimed that such understanding is possible on the basis of our being-with (see introduction). This is the structure of ‘world-time’. Husserl’s account is derivative for it is ‘disengaged’: unlike world-time, the structure Husserl describes does not have its extended present identified in virtue of our practical concerns. Consequently, the disengaged now is considered by Heidegger to be world-time with some of its features covered up or hidden (ibid., 210).

Underlying world-time is originary time. Originary temporality therefore makes possible the structure of world-time: “This teleology of [world-time] derives from the teleology of the originary future” (ibid., 154). This is because the tasks we engage in that form the nows of world-time are done for the sake of our larger projects – we set aside time for reading and typing because we are academics, and ‘being an academic’ is a possibility that we move toward. That is, being an academic (or any other ‘for-the-sake-of-which’) is futural. We understand ourselves and what we do in terms of what we are (academics, plumbers, carpenters, etc.). This is why Heidegger writes that “*the entity which in every case we ourselves are, is ontologically that which is farthest*” (Heidegger: 2006, H311).⁷⁰

⁷⁰ The dependence of world-time on ordinary time is not ‘simple dependence’ – that is, it is *not* the case that absent originary temporality there would be no world-time. Rather, how we understand our activities – i.e.

Heidegger's two paragraphs in *Being and Time* on temporality and grammar (see *ibid.*, H349) make a number of claims, amongst which are the following. First, the temporal phenomena of language (e.g. tense, aspect) neither refer to features of time nor occur simply because each act of speech is itself temporally extended. Rather: "Discourse *in itself* is temporal" (*ibid.*). Heidegger appears to be claiming that the temporal phenomena of language are grounded in the primordial temporality of concern, and, therefore, our originary temporality. Second, the ordinary conception of time as a sequence of contentless, insignificant moments does not enable us to conceive of how the temporal phenomena of language might be grounded – to explain this, we must invoke originary temporality. Third, a full explication of the "temporal characteristics of language-patterns" requires that the relation between "being and truth" is cast in terms of temporality (*ibid.*). This would allow us to move beyond the reduction of 'is' to a "mere copula" and instead define the word's "ontological meaning" (*ibid.*). Fourth, concept formation can be given an "intelligible" account only "in terms of the temporality of discourse" (*ibid.*). As noted in the introduction, Heidegger promises his readers such an account in Division III, but never actually produced it, leading Blattner to comment that "Heidegger appears to have nothing to say about the specifically temporal analysis of language and discourse" (1999, 122).

In this chapter I will examine Heidegger's claims with regard to aspect (tense, the other overtly temporal part of grammar, will be briefly addressed in chapter 7). Certain studies within embodied cognition have arguably developed Heidegger's first two claims. From cognitive linguistics, the 'neural theory of language' postulates that the semantics of verb and aspect is grounded in the structure of our bodies' motor commands (Feldman: 2008, 231; see also Lakoff 2003 and Lakoff and Johnson: 1999). Feldman (2008) and Lakoff (2003; see also Lakoff and Johnson: 1999) follow Narayanan (1997a, 1997b) in arguing that aspectual structure is grounded in "sensorimotor primitives" (Narayanan: 1997b). Narayanan describes a computational model of verbal aspect implemented on a Petri net, where specific activation states in two kinds of 'executing schemas' ('x-schemas') responsible for motor control – 'process primitives' and 'controllers' – are dynamically bound with a resulting meaning. Process primitives are the x-schemas for certain actions whereas controllers are x-schemas which capture control generalisations (e.g. 'enabling', 'inception', 'in-process', 'completion', 'suspension', 'resumption', etc.).

Aspectual modifiers in language are hypothesised to activate a given controller, thereby allowing certain inferences by the hearer, given the same underlying process

world-time – depends upon how we understand ourselves in terms of our possibilities – i.e. originary temporality (see Blattner: 1999, 153).

primitives (Narayanan: 1997a; 1997b; see also Feldman: 2008): “*Aspectual expressions are linguistic devices referring to... [x-schema] generalisations that recur in process monitoring and control (such as inception, interruption, termination, iteration, enabling completion, force, and effort)*” (Narayanan: 1997a, 94). Arguably, then, aspect is grounded in our embodied being-in-the-world – Heidegger’s first claim – and, since aspectual meaning is necessarily bound to our primordial nature as acting beings (aspect is always bound to a verb), the Husserlian ‘ordinary’ conception of time is insufficient to ground the temporal phenomena of language as it is unrelated to the structure of our action – Heidegger’s second claim.

The bulk of this chapter will be devoted to interpreting studies from cognitive linguistics and the neural theory of language through the lenses of Heidegger’s first and second claims. I will briefly mention Heidegger’s fourth claim – that concept formation is ‘intelligible’ only via the temporality of discourse – however a fuller discussion of this will wait until later chapters where it will be discussed alongside Heidegger’s third claim – that the relation between being and truth must be cast in terms of temporality. These will be more fully addressed in chapters six and seven. In the following sections I will discuss how the neural theory of language claims verb meanings are grounded in x-schemas, before discussing both Aktionsart and grammatical aspect.

5.2 Verbs and Actions

In the introduction it was noted that existential phenomenology contends that we are primarily *acting* beings: praxis is primordial; cognition is grounded in the more primal layer. A biological observation emphasised by the neural theory of language dovetails with this contention: “Nervous systems evolved for sensing and action; language is a very recent extra” (Feldman: 2008, 163). Two observations are central to the neural theory’s approach (see *ibid.*): first, children are proficient at many actions before they know the corresponding action-words; second, since actions unfold through time, children must have an “unconscious neural plan” for the action’s execution.

This ‘unconscious plan’ is formalised with ‘executing schemas’ (‘x-schemas’) – borrowed from robotics and AI – which are ‘motor control representations’ (Bailey: 1997, 27), and each of these formalised representations are assumed to be “an important simplification of the underlying... neural circuitry” (Feldman: 2008, 165). These computational x-schemas were developed prior to the discovery of mirror neurons (see chapter 1, above) however Feldman states that they “fit beautifully with those findings” (2006, 170). X-schemas, simplifying the underlying neural circuitry for an action’s execution, would thereby also be a summary of the same neural mechanism underlying perceptions of actions. The neural theory

postulates that this “complex synergy” which controls any given action, indirectly represented by a corresponding x-schema, “is the core semantics of the [action] word” (Feldman and Narayanan: 2004, 385).

A proposed account of concepts (based on neuroscientific evidence) which is explicitly linked with the neural theory of language is given by Gallese and Lakoff (2005). Their ‘interactionist’ theory of meaning utilises work on mirror neurons to hypothesise that understanding *is* imagination – that is, Gallese and Lakoff claim perceptual understanding requires *simulation*⁷¹ (2005, 456). Hence, a word such as ‘grasp’ ultimately acquires its meaning from the bodily ability to imagine, perform, and perceive grasping. Gallese and Lakoff postulate that imagination, performance, and perception all share the same neural substrate (ibid.). This neural substrate is theorised to consist of ‘functional clusters’ of neurons which characterise the “discreteness, high-level structure, and internal relational structure required by concepts” (ibid. 458).

However, Feldman highlights a ‘complexity problem’: “How could the meaning of an action *word* be the activity of a vast distributed network of neurons?” (Feldman: 2008, 167) Parametrisation is hypothesised to be the solution: A single x-schema might allow multiple types of action according to the value of a given parameter. For example, whether a cat trots or paces is determined by the brain’s encoding of a single parameter: speed (ibid., 165). Altering this parameter alters the patterns of muscle movement. It seems that we are only consciously aware of these parameters: “People have no direct knowledge of what muscles and firing patterns are involved in walking, but can think and talk about a few parameters such as the speed, direction, and assertiveness of the motion” (ibid.). The “crucial hypothesis” of the neural theory of language is “that *languages label only the action properties of which we can be aware*” (Feldman: 2006, 167), i.e. languages encode parametric variation such as direction, effector, posture, and repetition.

Different languages capture these parametric distinctions in different ways (examples from Bailey: 1997, 9-10; see also Feldman: 2008, 174-5). For example, the English words ‘push’ and ‘pull’ do not have exact equivalents in many other languages. Tamil uses ‘thallu’ and ‘ilu’ which do not precisely equate to ‘push’ and ‘pull’ as the Tamil words connote application of a sudden force rather than a continuous motion (which can be denoted via a suffix). Meanwhile, Farsi uses ‘hol-daadan’, which refers to (sudden) application of force to move an object away from oneself, and ‘feshaar-daadan’, which refers to the steady application of pressure to an unmoving object. Farsi also uses ‘zadan’ to denote “a large number of object-manipulations

⁷¹ The point does not seem to be a phenomenological one, rather a proposal that imagination and understanding require the same neural circuitry.

whose common character seems to be the use of quick motions” where the “prototypical *zadan* is a *hitting* action, though it can also mean *snatch* (*ghaap zadan*), or to *strum* a guitar (or play any musical instrument, for that matter!)” (Bailey: 1997, 10). English’s ‘drop’, denoting a ‘gentle’ release of an unsupported object, does not have a precise equivalent in Tamil or Cantonese. Both Tamil and Cantonese have a verb denoting ‘letting-go’, which does not specify whether the object is supported or not, and another denoting forcefully throwing down. Tamil uses ‘pudi’ which can mean either obtaining an object with a quick motion or continuing to hold an object – English translations could perhaps be ‘catch’ or ‘clutch’. Tamil also seems to have no equivalent of the English verb ‘to place’ – Tamil does use ‘vaie’ to denote a carefully executed putting of an object but the prototypical case of this verb is actually to maintain an object in its given location (and therefore a more appropriate English translation might be ‘keep’). ‘Podu’ is another Tamil verb denoting a putting action, but it is also not equivalent to ‘place’ as it denotes a more careless putting motion, such as throwing an object to a location. Cantonese uses the verb ‘meet’ to denote forceful manipulations with two fingers – ‘meet’ may be used for pinching, tearing, and also for tearing large items with two full grasps – another verb for which English does not seem to have an equivalent. Finally, the Spanish words ‘pulsar’ and ‘presionar’ might be translated into English as ‘press’, but make a distinction based upon the shape of the hand: ‘pulsar’ denotes pressing with a single finger; ‘presionar’ denotes pressing with the whole palm.

A computational model of verb acquisition developed by Bailey (1997) has the linguistic part interact with various x-schemas via a ‘linking feature structure’, or ‘f-struct’ (ibid., 50). The features are ‘parameter-orientated’, encompassing such things as force (i.e. whether a movement is softer or more powerful⁷²) and ‘duration’ (ibid. 57). Grounding verbs in x-schemas allows the f-struct to limit possible meanings to certain action categories and therefore “greatly restricts the size of the hypothesis space for verb acquisition, rendering it tractable” (ibid. 11). Bailey’s system was thereby able to use the x-schema for LIFT in order to distinguish *lift* from *heave*, the latter being applicable when the object is larger and required a higher level of force (ibid., 144). *Pick up* – treated as a single word – and *Hold* also use the LIFT x-schema: the former requires there be no initial contact with the object; the latter requires zero acceleration and corresponds to keeping an object suspended in place (ibid.). Equally, the model used the PUSH x-schema to distinguish *touch* and *slide*, and was able to capture the distinctions in Farsi described above, amongst numerous other achievements (see ibid.).

⁷² This is not to be confused with linguistic force (e.g. declarative, interrogative, etc.).

Leaving aside computational models, support for the grounding of verb meaning in motor processes also comes from psychological and neuroscientific evidence. One source of psychological evidence is gesture: Hostetter and Alibali (2010) compared descriptions of a pattern that the subject had witnessed with descriptions of a pattern that the subject had created. They hypothesised that, if such word meanings are grounded in motor processes (and if processing words involve activating motor representations) then if the subject had created the pattern they should gesture more (as their motor representations are activated). Their experiments produced a significant correlation to this effect, showing that subjects gestured at a higher rate when they had created the pattern than when they had observed it.⁷³

Kita and Ozyurek (2003) compared the gestures of speakers of English, Japanese and Turkish in cases where the utterances of these languages ‘packaged’ the same given information differently. For example, the English word ‘swing’ encodes an arc-like motion and, when describing the event of a cartoon cat swinging from one building to another, English speakers overwhelmingly opted to use this word supplemented with gestures of arc-shaped trajectory. By contrast, speakers of Japanese and Turkish – who do not have an equivalent lexical item – used a variety of different lexical items⁷⁴ and “produced a change of location gesture without the arc-shaped trajectory” (Kita and Ozyurek: 2003, 21).

Another type of psychological evidence is from the action compatibility effect. Glenberg and Kaschak (2002) demonstrated this phenomenon by comparing subjects’ reaction times when they were asked to press a button if they judged that a given sentence was interpretable. When the subjects were shown sentences involving descriptions of motion in the same direction as that required to press the button the response time was significantly faster than when the directions ‘disagreed’. This variation in response times was termed the ‘action compatibility effect’.

Bergen and Wheeler (2005) found a significant action compatibility effect in sentences describing actions in the third person, and therefore argued that it seems implausible to attribute the compatibility effect to suggesting that sentences in the first-person simply

⁷³ Hostetter and Alibali (2010) performed two additional experiments. Their second experiment was designed to investigate the possibility that subjects only observing a pattern had more time to think about how to describe it, and therefore less need to use gesture, whilst those who had to create the pattern had less time to think about how to describe and therefore an increased need to gesture. Their third experiment was designed to test whether increased use of gesture in those subjects that constructed the pattern were simply being primed to use greater action. Both their second and third experiments produced results which corroborated the outcome of their first experiment.

⁷⁴ Japanese speakers opted to use ‘iku’ (‘to go’), ‘tobu’ (‘to jump/fly’), and ‘shinobikomu’ (‘to sneak in’). Turkish speakers used ‘gidiyor’ (‘to go’), ‘ucuyor’ (‘to fly’), and ‘atliyor’ (‘to jump’). (See Kita and Ozyurek: 2003, 20)

primed subjects to perform the action.⁷⁵ Bergen and Wheeler (2005) performed a further experiment in which subjects were required to press a button with their hand forming a pre-assigned hand shape – an open hand or a closed fist – which was either compatible or incompatible with the displayed sentence. They found a significant compatibility effect – sentences compatible with the hand actions elicited faster responses than those which were incompatible.

Bergen, Narayan and Feldman (2003) investigated how motion verbs are processed by language users via a ‘matching test’. Subjects were presented with a stick-figure image for one second, where each image depicted actions primarily associated with one body area, specifically the hands, the mouth, or the legs. Subjects were then shown a written verb and asked whether the action depicted by the stick figure matched that of the verb. Half of the cases were ‘matching conditions’ (i.e. the action depicted by the stick figure matched that of the verb) and the other half were ‘non-matching’ conditions (i.e. the stick figure and verb did not match). The non-matching conditions were in turn split into two groups – ‘same-effector’ and ‘different-effector’ conditions. In the former, the action depicted and the action described made use of the same body areas, whereas in the latter they did not. The experimenters found significantly longer response times during the same-effector condition than during the different-effector condition.

The explanation of this effect advanced by the experimenters relates to the hypothesised grounding of verb-meaning in the motor cortex. According to this proposal, when any given action is depicted or described, the neural circuitry responsible for performing that action will be activated. Hence, in the same-effector condition two different *but related* circuits should become active, and neural circuits controlling similar actions *inhibit* each other (the consequences of “trying to walk and chew gum simultaneously are less dire than those of trying to walk and waltz simultaneously” – Bergen et al.: 2010, 971). By contrast, in the different-effector condition two entirely separate motor circuits should become active and therefore one circuit should not inhibit the other. The inhibiting of one neural circuit by means of a related one is thus hypothesised to account for the delayed response during the same-effector condition. Bergen, Lau, Narayan, Stojanovic, and Wheeler (2010) continued this line of reasoning, replicating the experiment, and also found the same effect to be present when the experiment was performed *without* stick figures, i.e. subjects were shown a verb followed

⁷⁵ The experimenters qualify their results: “...unexpectedly, this [action-compatibility] effect was observed not on the length of time it took subjects to read the sentence and release the button keeping the sentence on the screen, but rather on the time between the release of this button and pressing of the response button – that is, in the time it took to actually execute a response” (Bergen and Wheeler: 2005).

by another verb and asked to judge whether the verbs were synonymous or not. The same-effector condition produced a significantly delayed response when compared to the different-effector condition under this variation (see Bergen et al.: 2010, 976).⁷⁶

Combining the action compatibility effect with the emphasis on neural processing, Tseng and Bergen (2005) adopted the action compatibility effect in order to investigate whether accessing lexemes also accesses motor areas. The subjects were signers of American Sign Language (ASL) and were tested via a matching task, being shown two signs in sequence and asked to judge as quickly as possibly whether they were the same sign or not. Three groups of lexemes were used in the test: 'semantic signs', which look iconically like the actions they express (e.g. 'catch' and 'bowling'); 'metaphorical signs', which use motion to convey a more abstract meaning (e.g. 'tell', where the hand starts under the chin and moves forward); 'phonological signs', which are directional but whose direction is not related to their semantics, literally or metaphorically (e.g. 'girl', which is signed by the thumb moving away from the face). Subjects were shown sixty-six signs, a third of which were 'semantic', a third 'metaphorical', and a third 'phonological', where half of each group were encoded with hand movements forward (i.e. away from the body) and the other half with hand movements backward (i.e. toward the body). In order to assess the extent of the action-sentence compatibility effect, the experimenters positioned one button further away from and another closer to the subject. Subjects pressed one button for 'same' and the other for 'different', and which button was 'same' and which was 'different' changed halfway through the experiment (with the subject's knowledge). The results displayed a significant action compatibility effect in cases of semantic and metaphorical signs, i.e. it took subjects longer to press a button when the direction of the sign was incompatible with the location of the button. However there was *no* incompatibility effect in cases where the bodily motions of the signs were unrelated to the semantics of the sign, i.e. in cases of phonological signs.

Various neuroscientific studies are often taken to lend support to the claim that verb-meanings are grounded in neural motor-circuitry. Tettamanti et al. (2005) found that subjects listening to action-related sentences showed neural activation in the fronto-parietal-temporal region, which is also activated upon action performance and perception. Tranel et al. (2001)

⁷⁶ Two other experiments were performed by Bergen et al. (2010). The first both reversed the order of the stimuli, i.e. written verbs now preceded the stick figures, and used a non-Indo-European language, Cantonese, chosen due to its logographic alphabet. The experimenters found that the delayed response time during the non-matching, same-effector condition persisted (implying that in the first experiment the picture was not priming the subjects to unconsciously select the relevant verb) and that the results held cross-linguistically. In a further experiment, Bergen et al. tested the effect on 'second-languages' with subjects that were non-native English-speakers, finding that "nonnative English speakers performed like natives in that responses when the image and verb shared an effector were slower than when they did not share an effector" (2010, 979).

showed subjects with unilateral brain damage (i.e. damage confined to either the left or the right hemisphere) a series of photographs and asked them to utter a single word describing a depicted action or object. Subjects with lesions in the anterior temporal and inferotemporal regions suffered impairments when attempting to name concrete objects, but were unimpaired when naming actions. The experimenters took this to suggest that there exists a preferred system for processing knowledge of concrete entities – located in the ventral occipitotemporal and the anterolateral temporal cortices – and a different preferred system for processing actions and their corresponding words – located in the ventrolateral premotor/prefrontal region (2001, 667).⁷⁷ This supported previous work by Pulvermüller et al. (1999) and Martin et al. (1995): the former experiment used electro-encephalography (EEG) to reveal distinct neural areas for the processing of nouns and the processing of verbs⁷⁸; the latter used PET scans to distinguish neural areas used for processing verbs, and those used for colour terms.

There appears, then, to be significant evidence suggesting that verb-meanings are grounded in our embodied being-in-the-world. Importantly for Heidegger's claims – which emphasise temporality – verbs, *qua* lexical items, have an internal *temporal* structure: Aktionsart. To 'tap' or to 'walk' are inherently iterative, implying rhythmic repetition of an action through time, whereas to 'hit' or to 'step' are not inherently iterative and imply a single instance of the action. Bailey's computational model (1997) captured this quality by linking words with parametised x-schemas: a given x-schema is capable of grounding multiple verb meanings, and the differences between those meanings (for example, the differences between 'step' and 'walk') may be interpreted as parametric differences (in this case, whether the x-schema should iterate the motor action or give a single performance). However, verbs might also have their temporal structure modified via grammatical aspect – for example, saying 'the policeman stood at the crossroads' denotes a single, complete action whereas saying 'the policeman used to stand at the crossroads' is (usually) interpreted as being

⁷⁷ However, the experimenters also qualify these results by emphasising that their findings did not support a *complete* segregation of those neural areas responsible for action-naming with those responsible for object naming: "we found that a number of subjects with left premotor/prefrontal lesions and impaired action naming also had impaired naming of concrete entities. Also, disproportionate action naming deficits were associated with lesions of the leftmesial occipital cortex, and of the paraventricular white matter underneath the supramarginal gyrus and posterior temporal region, in addition to the frontal opercular region" (Tranel et al.: 2001, 665).

⁷⁸ Once again, there are at least four qualifications to these results (see Pulvermüller et al.: 1999, 505): first, some patients with no (detectable) lesions in their frontal lobes nonetheless have difficulty processing verbs; second, there exists (PET) evidence suggesting activation of the middle temporal gyrus relating to verb processing and eliciting movements associations; third, evidence exists that patients may have verb- or noun-impairments relating to one modality (e.g. orthographic or phonetic) but not others; fourth, it is unclear that what determines a word's cortical localisation is that word's category (e.g. noun, verb, etc.).

habitual, i.e. that the complete action was repeated over time at regular intervals.⁷⁹ The next two sections will address Aktionsart and aspect respectively, focusing on how Narayanan grounds both Aktionsart and aspect in the general structure of x-schemas.

5.3 Aktionsart

Aktionsart is a given verb's *inherent* aspect: "The... distinction is between aspect as grammaticalisation of the relevant... distinctions, while Aktionsart represents lexicalisation of the distinctions" (Comrie: 1976, §0.2; see also Narayanan: 1997, 102). For example, the verb 'walk' is inherently *iterative*, as walking requires iterated steps, whereas the verb 'step' is not iterative, as the stepping requires only a single instance of the action. The classic taxonomy of Aktionsart – which has "stubbornly resisted... refinements proposed in subsequent work" (Chang: 1998) – is given by Vendler (1967), who classified verbs and verb phrases into 'states', 'achievements', 'activities', and 'accomplishments'. In this section I will review Vendler's classification, and draw upon the neural theory of language to illustrate how the features of x-schemas "are sufficient to characterise what is traditionally called Aktionsart or inherent aspect" (Narayanan: 1997, 102).

A basic distinction is between telic and atelic actions. Telic verbs "proceed toward a terminus which is logically necessary to their being what they are" (1967, §4.2). Vendler refers to those telic verbs whose meaning refers to a definite moment as 'achievements' (ibid.) and those whose meaning refers to an extended period as an 'accomplishment' (ibid.). For example, we can say 'It took him three hours to reach the summit' which describes an achievement (i.e. an event occurring instantaneously) but this does *not* imply that the 'reaching' went on for three hours. By contrast, the accomplishment 'It took him three hours to write the letter' *does* imply that 'writing' went on for three hours (ibid., §4.3). Put differently, I can say that 'I am writing' at any point during the three hours, but it would be odd to say 'I am reaching' at any point during the three hours (ibid.).

By contrast, atelic verbs have no necessary terminus. For example, 'How long was he running for?' is grammatical whereas '*How long did it take to run?' is not (ibid. §4.2). Activities are those atelic verbs which "consist of successive phases following one another in time" (ibid.). Vendler also points to 'states' which are atelic but do not refer to a given temporal duration. For example, if someone asks what you are doing you might respond 'I am running', as 'running' is an activity, but not '*I am knowing', as 'knowing' is a state that one may or may not be in: "knowing and its kin are not processes going on in time. It may be the

⁷⁹ An alternative interpretation appears to be possible: That the policeman stood at the crossroads for an extremely lengthy period of time before moving away (in the same way that a statue would have stood in a particular location before being moved).

case that I know geography now, but this does not mean that a process of knowing geography is going on at present consisting of phases succeeding one another in time" (ibid.).

Before discussing the neural theory of language's adoption of Vendler's classification, it is worth emphasising that although Vendler refers to his categories as 'verb classes', the verb alone often does not determine its Aktionsart. For example 'walk' appears to be an activity, i.e. atelic ('He walked for two hours' is grammatical, but '*He walked a mile for two hours' is problematic), however, the verb might be made an accomplishment, i.e. telic, with an appropriate predicate ('*He walked in two hours' is problematic, whereas 'He walked a mile in two hours' is grammatical). As Boogaart and Jansen point out, "if other elements in the clause codetermine 'lexical' aspect, this raises questions as to the usefulness of classifying verbs as such... This suggests that *Aktionsart* is a property of complete clauses rather than a property of verbs or predicates" (2007, 814). Hence, Aktionsart is not determined by the verb alone.

Narayanan (1997a, 110) derives Vendler's classification from a subset of three x-schema process parameters. A basic parametric distinction is between dynamic [+d] and stative [-d]. Vendler's states are defined by Narayanan as the single parameter [-d], whereas accomplishments, activities, and achievements are characterised by being [+d]. A state, in terms of the x-schema framework, is considered to be a 'marking vector', that is, a multi-set of marked places/nodes in the network – in the simplest case, a single place. Therefore, being in a state is the activation of (in the simplest case) a specific node and leaving that state involves firing an 'output transition', (at least) one node of which was previously active and marking the state (ibid. 111).

Activities, like states, are atelic and therefore marked by the parameter [-t], though an additional distinction may be made here: activities may be either durative [-a] or punctual [+a]. The x-schema framework may represent transitions as either having real durations or as being instantaneous (ibid., 110-1). Narayanan notes that whether an activity has a real duration or not depends on the intrinsic duration of the action (s_i), as represented in x-schema, and the 'reference time scale' (s_R). If the activity's duration is on the same order as the reference time scale then the action is conceived as durative, but if the reference scale is significantly larger than the activity's intrinsic duration then the action is conceived as punctual. For example, the intrinsic duration of a single cough is very short compared to the reference frame of our normal experience and therefore a cough is a punctual activity. In contrast, because the intrinsic duration of a run is of the same order the flow of our own experience it is conceived of as a durative activity.

Accomplishments and achievements – both telic [+t] – are likewise distinguished in terms of whether they are punctual [+a] or durative [-a]. In terms of the x-schema framework, both achievements and accomplishments correspond to goal-enabled (i.e. telic) x-schemas, but the former is a transition whereas the latter is a process (Narayanan: 1997a, 110).

Telicity itself, distinguishing between states and activities on the one hand and accomplishments and achievements on the other, may be treated simply as “as progress toward some goal, often depleting some limited resource, e.g., the distance to the park in *walk to the park*” (Chang et al.: 1998). Hence, if the x-schema specifies a goal it is [+t] and if it does not it is [-t].

The grounding of Aktionsart in x-schemas allows Narayanan to avoid Dowty’s ‘imperfective paradox’ (see Dowty: 1977), which arises due to Dowty’s reliance on truth-values of predicates (Chang: 1998). In order to see the paradox, notice that instances of such accomplishments can be identified by testing to see whether there is no entailment from progressive to perfect forms of the verb. For example, ‘John was pushing a cart’ (progressive) entails ‘John pushed the cart’ (perfect) and is therefore not an accomplishment. However, ‘John was drawing a circle’ does *not* entail ‘John drew a circle’ and therefore *is* an accomplishment (for further discussion, see Vendler: 1967 and Dowty: 1977). The imperfective paradox arises because Dowty’s maintains “that it is impossible to give an adequate analysis of accomplishment verbs without providing for the entailment that such a result comes about. Yet it is just this entailment that such a result-state comes about which fails when the accomplishment verb phase appears in a progressive tense” (Dowty: 1977, 46). For Narayanan, Dowty’s paradox simply does not arise. Because the meaning of the verb is not grounded in the truth-value of their entailments but rather in the underlying x-schema, accomplishments are considered to have been successfully performed when the ‘finish’ node fires – and the finish node may fire if (and only if) the goal of the action, which is also specified in the x-schema, is met (Narayanan: 1997a, 118-9).

5.4 Aspect and ‘World-Time’

However, the internal temporal structure of an event is not just determined by a given verb’s Aktionsart. Modification of this temporal structure also occurs grammatically via *aspect*. Comrie (1976, §1.0) draws a basic distinction between perfective and imperfective, or progressive, aspect⁸⁰: perfectives refer to a complete event, i.e. the event as a whole “without

⁸⁰ Comrie distinguishes between ‘perfective’ and ‘perfect’. ‘Perfective’ contrasts with ‘imperfective’, whereas ‘perfect’ denotes “a past situation with present relevance” (Comrie: 1976, §0.3). To avoid confusion, I will follow Comrie’s distinction and avoid the word ‘perfect’ in subsequent discussion.

distinction of the various separate phases that make up that situation”⁸¹; progressives pay “essential attention to the internal structure of the situation”.⁸² There is considerable psychological evidence, some of which is reviewed below, that adopting the perfective or the progressive significantly affects a subject’s construal of the described event as temporally extended, even if the Aktionsart of the verb in question is telic (such completion does not appear to be temporally extended). Aspect also appears to influence the gestures employed by speakers during their uttering of a given expression. Like verbs and Aktionsart, aspect is grounded in the x-schema framework by proponents of the neural theory of language. After reviewing these areas, I will assess the implications for the first two of Heidegger’s claims (identified above).

Anderson et al. (2008) investigated how grammatical aspect is involved in our understanding of motion events by utilising ‘mouse-tracking’ (subjects were sat at computers and software tracked the x,y coordinates of the mouse as the subjects moved it across the screen). The task involved reading a sentence in either the progressive or the perfective aspect (e.g. ‘John was jogging to the woods and stretched when he got there’ and ‘John jogged to the woods and stretched when he got there’ respectively) and then to click on a character on the computer screen and move them to the position subjects felt was appropriate on a picture (e.g. a path leading to some woods). The experimenters observed a tendency for perfective sentences to induce subjects to position the character closer to the end of the path, whereas progressive sentences showed more subjects positioned the characters toward the beginning and middle of the path. This would imply that, whereas the perfective focuses attention at the end of the event, the progressive may focus attention on a more extensive temporal structure. The average time it took subjects to move the character (from when they first clicked and began dragging to when they released it in the desired location) also displayed a significant difference – when subjects had read a progressive aspect such movement took longer than when they had read a past perfective.

Matlock asked subjects to complete sentences which began in either the perfective or the progressive, i.e. as ‘When John walked to school’ or ‘When John was walking to school’ respectively (2011, 138). Interestingly, subjects were more likely to complete the sentence with multiple actions when the initial part was in the progressive as opposed to the perfective, suggesting that the progressive can cause people to “conceptualise more action than

⁸¹ However, Comrie emphasises that this say nothing about whether the events was actually completed or whether it was simply attempted (1976, §1.1).

⁸² In combination with tense (see next chapter), progressive aspect might also be defined as “ongoing at reference time” (Bybee et al.: 1994, 126).

perfective aspect” (ibid., 139).⁸³ Further analysis of the results revealed those sentences given initially in progressive aspect were more likely to incorporate verbs denoting motion or perception, leading Matlock to conclude that the results show that “people conceptualise more action when they process progressive descriptions of events” (ibid., 140). These results could perhaps be interpreted in terms of ‘action orientated representations’ (see chapter 1, above) in that the progressive is understood in terms of an ongoing motor process, i.e. temporally extended, whereas the perfective is understood in terms of a completed motor process, and ‘completion’ does not seem to be something of extended duration.

Interestingly, then, *telicity* makes no apparent difference to subjects conceptualising longer periods of time if shown in the progressive aspect: In the telic variant subjects read a sentence which appeared in either the progressive or perfective aspect, i.e. ‘John was painting houses last summer’ or ‘John painted houses last summer’ respectively, and then answered the question ‘How many houses?’ Painting a house has a definite terminus (when the house is painted) and is therefore telic. Subjects gave higher estimates when the initial sentence was in the progressive as opposed to the perfective (ibid., 141). In the atelic variant, subjects read an atelic sentence in either the progressive or the perfective aspect, i.e. ‘John was driving last weekend’ or ‘John drove last weekend’ respectively. Subjects were then asked ‘How long (number of minutes or hours)?’ and once again gave higher estimates when the initial sentence was in the progressive aspect.

Madden and Zwaan (2003) had subjects read sentences describing an event then compare those sentences with pictures of the event. The experimenters theorised that if the perfective and progressive aspects constrain a subject’s conceptualisations of an event then a given sentence’s aspect should constrain the corresponding interpretation of the picture. Their results indicated that when subjects read an event in the past perfective they would tend to interpret the event as completed. However, interestingly, the correlation was far weaker (to the point of nonexistence) with the progressive aspect, i.e. reading the sentence in the past progressive did not automatically conceptualise the event as ‘in progress’.⁸⁴ On a related note, understanding aspect might benefit those seeking election to political office: Fausey and Matlock (2011) found that when a politician’s ‘indiscretions’ were described in the (past) progressive aspect, inducing a point of view internal to the event, subjects thought

⁸³ There appeared to be no significant correlation between the aspect given in the initial part of the sentence and the tendency to complete the sentence with a *single* event (Matlock: 2011, 139).

⁸⁴ A second experiment by Madden and Zwaan (2003) tested subjects’ response times when they were asked to judge whether a picture matched a sentence (in terms of temporal structure), finding that response times were noticeably faster in cases of matching sentences in the past perfect (once again, progressives yielded no significant correlation).

them less likely to be re-elected than when those same indiscretions were described with the (past) perfect aspect, which induced an external construal of the event. For example, a phrase like ‘was taking hush money’ created a more negative impression than the phrase ‘took hush money’: “people were more confident in voting not to re-elect a senator who *was doing* negative actions than a senator who *did* negative actions” (2011, 7). A conjecture as to why this effect was produced might be that an external perspective on the event implies that the event is ‘closed’, i.e. observing the event as a whole implies it reached its end-point, whereas an internal perspective on the event need not imply that the event has ended – implying that someone who was taking hush money still could be (‘He was taking hush money and still is’ is grammatical whereas ‘*He took hush money and still is’ is ungrammatical).

These experiments would seem to indicate that despite certain verbs being telic – a lexical property concerning Aktionsart – grammatical aspect seems required in order to specify whether the ‘goal’ has been met or whether the action is in progress. More importantly, alterations in aspectual structure seem to significantly alter the construal of an event’s temporal structure. Studies of gesture appear to provide additional support for differing construals of temporal structure, as experimenters have noted gestural differences which co-vary with aspect.

It has been observed that speech and movement are “kept together in an intricately coordinated flow... [and] are shaped and reshaped to stay together” (McNeil: 2003, 7), from which McNeil has argued that “iconicity is an organising principle of motion control – actions are performed in relation to speech in such a way as to create an image of the meaning in part” (ibid., 1). McNeil (2003) analysed the gestures of subjects when they used either the perfective or the imperfective/progressive aspect during utterances involving verbs of different Aktionsart (McNeil utilised Vendler’s distinction between achievements, accomplishments, and activities, though he does not appear to discuss ‘states’). Achievement verbs, e.g. ‘I release’, were not uttered until the accompanying gesture had been performed when used in perfect aspect, whereas when they were used in progressive aspect they were uttered prior to the gesture’s endpoint (ibid., 10). Accomplishments verbalised in perfect aspect, such as ‘I push down on...’, were uttered prior to the accompanying gesture/action (ibid.), whilst during expressions in progressive aspect, such as ‘I am pushing down on...’, the word ‘down’ was timed to occur in the middle of the gesture and the word ‘on’ was timed to occur at that gesture’s end-point (ibid.). Activities expressed in perfect aspect, such as ‘I push this across...’, were accompanied by a gesture that was completed by the end of ‘push’ (ibid.), whereas activities expressed in progressive aspect, such as ‘I am pushing this across...’, were

accompanied by a gesture that was only at the midpoint of its performance when the word ‘this’ was spoken (ibid. 9). During the experiments it was noted that, if ever the subject’s speech and gesture occasionally threatened to fall out of synchrony, the subject would add ‘non-functional movement’ to the gesture in order to extend their action in time, “particularly when the verb is progressive and the real action is coming to completion too soon” (ibid., 6).

Summarising his results, McNeil notes that with imperfective/progressive aspect gestures are performed simultaneously with the relevant part of the utterance, implying they are timed in order to create an ‘inside’ view of the event (ibid., 11). By contrast, when perfective aspect was employed, the gesture took place outside the relevant part of the utterance in order to create an external perspective upon the event (ibid.). McNeil concludes: “motor control over action, both imagined and actual, is not independent of the linguistic dimension of aspect; action is kept in a determinate relationship to speech in terms of timing that conforms to the aspectual perspective the speaker is taking” (ibid., 13).

Duncan studied the gestures of native English and native Mandarin speakers⁸⁵, aiming to ascertain whether “the distinction between perfective and imperfective verb aspects in speech is related to distinctions in the form and execution of gestures in both languages, when the stimulus to be described is held constant” (Duncan: 2002, 190).⁸⁶ The results suggested three conclusions (ibid., 203): first, the speaker’s choice of aspect appeared largely independent of the nature of the event itself which was being described; second, aspect appeared “to set a significant part of the framework for gestural iconic description” of observed events, i.e. gestures performed during speech making use of progressive aspect took longer to produce and exhibited more complexity than those performed during speech with

⁸⁵ Mandarin contrasts with English in that, whereas the latter has impoverished morphological marking for aspect but does morphologically mark tense, Mandarin has a rich aspectual morphology but does not morphologically mark tense, instead locating events in time via explicit temporal references (Duncan: 2000, 184). Mandarin also morphologically marks *Aktionsart*, for example:

Ta	ting-dao	le
He	listen-COMPL	PFVE
He	hears this	

Whereas English uses the lexeme ‘hear’, as opposed to ‘listen’, Mandarin has the single lexical item ‘ting’ which requires ‘dao’ to signal completive or resultative *Aktionsart* (Duncan: 2002, 186), i.e. in Vendler’s terminology, an accomplishment (see above). Mandarin then assigns perfect aspect by adding ‘le’ (Duncan: 2002, 187). Aspect, not *Aktionsart*, was the focus of Duncan’s study and was used in order to ascertain the subject’s conceptualisation of the event, however if overt aspectual marking was not present then *Aktionsart* was used instead.

⁸⁶ Duncan focused on the following aspectual distinctions: imperfective-progressive (‘zai’); imperfective-durative (‘zhe’); and perfective (‘le’). These were not the only aspectual markers used by speakers during the experiments, but “were chosen because, in the story-telling and short-descriptive discourses examined here, they occurred with frequencies sufficient to accumulate reasonably large data sets for analysis and comparison” (Duncan: 2002, 185).

the perfective aspect; third, no significant cross-linguistic differences were found in the gestures employed by speakers of English and Mandarin, implying that “the domain tapped by linguistic aspect is very fundamental in human cognition” (ibid.).

Fey et al. (2013) presented subjects with a series of events described in either the past progressive or the past perfect, i.e. either as ‘was *VERB*-ing’ or ‘had *VERB*-ed’ respectively, and then asked subjects to describe the depicted events to a listener in order to observe their gestures. More complex gestures observed during a subject’s description of a particular event were considered indicative of subjects having a more complex construal of that event’s temporal structure. In particular, the experimenters looked for iteration in gesture. The results revealed that when subjects were presented with a progressive description of an event their gestures were more complex than when the description was presented to the subject in the perfect.⁸⁷ Interestingly, though, the correlation was such that only when subjects were *presented* with a progressive description did their telling of it involve complex gestures. If a subject decided to describe an event presented in the perfect their description would involve simpler gesture. Fey et al. suggest that this might imply that aspectual use does not necessarily reveal the speaker’s underlying conceptualisation of an event (2013, 150).

Finally Bergen and Wheeler (2009) had one group of subjects read progressive sentences (e.g. ‘John is opening the draw’) and the other perfective sentences (e.g. ‘John opened the draw’). Subjects were asked whether the motion described in the sentences required movement toward or away from the body, and their response times revealed a significant action compatibility effect for those sentences in the progressive aspect, but *not* for those given in the perfective aspect. The experimenters contend that because the progressive aspect takes an event-internal perspective, subjects were “driven to simulate the internal processes of described events” whereas the event-external perspective of the perfective aspect requires no conceptualisation of the event’s internal structure (and hence no compatibility effect).

This basic aspectual distinction between progressive and perfective therefore gives significant psychological effects, and these effects appear to have significant correlations in gesture. Aspectual structure, contend proponents of the neural theory of language, may also be modelled in the x-schema framework (Narayanan: 1997; Chang et al.: 1998; Feldman:

⁸⁷ Importantly, there was no correlation between the length of an utterance and the complexity of the gesture – in other words, there is no indication that the complexity of gestures increases when utterances are progressive only because progressive forms tend to be longer, because the progressive utterances were not always longer than the perfect forms (see Fey et al.: 2013, 151).

2008).⁸⁸ Integral to this account is the ‘controller’ which depicts the general control structure of all x-schemas and whose structure is considered to have “exactly the organisation needed for much of the semantics of linguistic *aspect*, the structure of events in general” (Feldman: 2008, 231). Importantly, the controller itself is an active x-schema which interacts with both particular x-schemas (i.e. those controlling specific embodied actions) and the world (Chang et al.: 1998). The controller has the following structure (see Feldman: 2008, 230-1):

- Getting into a state of readiness
- Initial state
- Starting process
- Main process
- Option to stop
- Option to resume
- Option to iterate/continue main process
- Check to see if goal has been met
- Finishing process
- Final state/Done

Aspect is grounded in the controller x-schema in that the aspectual structures of a given language activate various nodes on the controller, and, just as instances of linguistic aspect are always bound to particular verbs, instances of the controller x-schema link to an underlying x-schema for a given action: “Aspectual modifiers... provide an *initial marking* to the CONTROLLER schema... The *inherent semantics* of a verb form interacts with the controller” (Narayanan: 1997a, 113). The “key”, as Feldman (2008, 230) puts it, to grounding the progressive aspect is the ‘main process’ node. Any given action’s x-schema may be embedded within the controller as the main process. Hence, this node serves to ground the meaning of the progressive aspect: ‘walking’ is in the progressive aspect and therefore involves embedding the x-schema for ‘walk’ within the main process node of the controller. Notice that the underlying x-schema for ‘walk’ is inherently iterative (as the actual leg motion is repeated). The inherent aspect of the verb therefore interacts with controller, via the latter’s main process node, to result in ‘walking’ being interpreted as an iterative action in progress. The perfective ‘walked’, by contrast, may arise from the embedding of the underlying x-schema within the ‘final state’ node of the controller (Chang et al.: 1998).

Progressive and perfective are not, however, the only aspectual structures. The iterative aspect – “[event-] internal cyclic activity” (Chang: 1997, 3) – has already been introduced when noted as inherent to the verb ‘walk’, but it may also be imposed grammatically. The verb ‘cough’, for example does not appear to be inherently iterative, but

⁸⁸ If it is accepted that aspect is grounded in embodied motor processes then this perhaps provides a manner to account for co-variation of aspect and gesture. I will not pursue avenue of research here.

may be iterative if the underlying ‘process features’ of the x-schema for cough, i.e. those features constituting the main process of cough (excluding the finishing process, final state, initial state, etc.), is embedded in the controller’s option to iterate. In English the iterative aspect is usually marked with the suffix ‘-ing’, hence ‘coughing’ denotes repeated coughs all forming the same event.⁸⁹

Similar to the iterative aspect is the habitual, but whereas the iterative is regular, cyclic activity within the event, the habitual signifies “regular recurrence of the event itself” (ibid., 3). An example from English is ‘Bill used to run’, which suggests that Bill used to engage in a particular activity – i.e. running – at regular intervals. Habitual aspect, in the x-schema framework, is said to be grounded as an entire underlying x-schema (i.e. finished actions) embedded in the iterate option of the controller.

Other aspectual forms include the ‘prospective’, the ‘imminent’, and the ‘ingressive’ aspects. Prospective aspect corresponds to the state of being about to act and prospective constructions, in English, include ‘to be going to’, ‘to be about to’, and ‘to be on the point of’ (Comrie: 1976, §3.3). Imminent aspect might be thought of as readiness, i.e. ‘I’m ready to run’ (Narayanan: 1997a, 114), and getting ready – i.e. moving from the prospective to the imminent – might require reorienting yourself, ceasing another activity, resting for a moment, etc. (Feldman: 2008, 230). Ingressive aspect refers to the start of an action, e.g. ‘She left in 10 minutes’ refers to the start of the event of leaving and is roughly synonymous with ‘It took her 10 minutes to leave’ (Chang: 1998). The prospective, imminent, and progressive can be grounded in the controller as getting into the state of readiness, the initial state, and the starting process respectively (Narayanan: 1997a, 114).

Additionally, the x-schema is able to model the terminative and interruptive aspectual divisions (Narayanan: 1997a, 114). The former may be modelled as the controller’s finishing process. By contrast, the latter is a failure to reach the goal specified in the x-schema (ibid., 121) and in English is often lexically encoded – ‘stumble’, for example, denotes an interruption of the walk x-schema (ibid., 114).

Technically, it should be emphasised, ‘aspect’ is a term used to denote *event* structure, not simply the structure of actions. Zacks and Tversky emphasise that “the terms *action* and *event* are not synonymous” and point out that whilst many events are actions, by no means all of them are: “Actions are performed intentionally by actors, so they are less general than

⁸⁹ It would sound odd to say ‘*He was coughing’ with the intended meaning that someone coughed once as a cough is quite a punctual event. Special cases, however, are conceivable – if, say, footage of a person was played in slow motion during which the person coughed, then it might be possible to use ‘coughing’ with progressive meaning (i.e. ‘When he was coughing...’ – see Comrie: 1976, §2.1).

events” (Zacks and Tversky: 2001, 4).⁹⁰ However, if it is true that the aspectual meaning “has the same structure as motor control” then it follows that “we understand the structure of any event at all (no matter how ‘abstract’) in terms of what our bodies can do” (Lakoff: 2003, 68). On this interpretation, then, understanding events remains grounded in our embodied being-in-the-world, and Lakoff gives some evidence from conceptual metaphor to suggest this is indeed the case: “any event can be conceptualised as an action by an agent” (ibid.). This EVENTS ARE ACTIONS metaphor allows us to speak of the wind *blowing* on the door or the sun *glaring* down at us.

The psychological studies and the computer model discuss seem to provide a powerful case that our embodied motor processes ground verbs, their Aktionsart, and aspect: we understand what the words ‘walk’ and ‘grasp’ mean because the semantics of those words is a parametrised x-schema; the modification of a given verb’s meaning via aspect is possible because aspect is grounded in the ‘controller’, or the general structure of all x-schemas. I will return to the controller x-schema below, but in the remainder of this section I will use the studies cited as a basis for the critical evaluation of Heidegger’s claim that the category of aspect is grounded in the ‘primordial temporality of concern’.

Recall from the first section of this chapter that Heidegger argued ‘originary temporality’, i.e. the manifold of nonsuccessive phenomena, is primordial and that world time, i.e. “the sequence of Nows that are spanned, dated, public, and significant” (Blattner: 1999, 136), is derivative. Contra Heidegger, aspect does not appear to be grounded in *originary* temporality. Rather, being grounded in the structure of embodied action, our understanding of aspect appears to be grounded in world-time, where the significance of the now phase is that of the action (e.g. the current time might be the time to walk) and the span refers to internal time frame of the action. The span might be represented in the x-schema framework as the transition from getting in to the initial state to the action’s final state, and might require other actions to be done prior to the main action, e.g. if it is time for cooking the first part of this time might be time for chopping vegetables. Any activity, for example cooking, might be done for the sake of futural commitments, such as being a chef, but these future commitments are not obviously relevant to our understanding of aspect and therefore it seems wrong to assert, as Heidegger’s first claim does, that aspect is grounded in *originary* temporality.

⁹⁰ Zacks and Tversky also maintain that “actions happen objectively in the world, whereas... events arise in the perception of observers” (2001, 4). This distinction appears to be an instance of the subject-object dualism and, given the existential-phenomenological perspective I adopt in this thesis, such a distinction is precluded by taking seriously the idea that we are primordially ‘Dasein’ (see Introduction, above).

Heidegger's second claim – that grammatical aspect cannot be grounded in the conception of time as a series of contentless, insignificant moments – fares much better. Grammatical aspect, if grounded in the temporal structure of action (represented in the controller x-schema), and if our actions simply *are* meaningful, then it seems that aspect is grounded in something contentful and significant. That is, aspect is not grounded in 'ordinary' temporality but rather 'world-time'.

5.5 Grammar and Action

A verb's temporal structure may be modified grammatically in two ways. Firstly, a verb's Aktionsart might be modified through the addition of a complement. For example, on Vendler's classification 'he walked' is an activity (we can say 'he walked for two hours') whereas 'he walked to the shop' is an accomplishment (we cannot say '*he walked to the shop for two hours') – hence, the Aktionsart of walk may be modified via a complementary prepositional phrase. Second, the verb's temporal structure might be modified via aspect: the perfective 'I have walked' may become the iterative progressive 'I am walking' or the habitual 'I used to walk'. The sections above suggest that the internal temporal structure of events is grounded in the structure of our actions, and used Narayanan's 'x-schema' model to illustrate how this might be so. In this final section, I argue aspectual language requires more than the presence of motor structure (in Narayanan's model, 'x-schemas') – aspectual language presupposes a relational structure which makes possible the grounding of such temporal meaning; it presupposes *grammar*.

In this respect it is important to note that Narayanan's model (1997) assumes information arrives *pre-parsed* into units which allow features to be valued correctly.⁹¹ Hence, Narayanan's model can use phrases such as 'to the shop' to change the Aktionsart of the verb from an activity to an accomplishment (i.e. to specify a goal in the underlying x-schema), but this presupposes the prepositional phrase can be put in the correct relation to the verb. Equally, aspectual grammar, whether implemented via morphology (e.g. 'V-ing') or embedding (e.g. 'used to V'), presupposes a relational structure. However, it is one thing to note the role of grammar in altering Aktionsart or in relating verb and aspect, it is another to suggest that the grammatical relations *enable* the grounding of the aspectual category. The argument that

⁹¹ "...we assume the presence of a parser which is able to initiate the f-struct by setting specific features to specific values based on the linguistic input. As an example of this process, consider the linguistic input 'take small steps'... Here the result of the parsing process specifies that the x-schema being referred to is WALK and that the *step size* parameter has value *small*. The input to our model is the linking structure with the parameter values specified... This parameter setting translates to executing the WALK x-schema with a small step size" (Narayanan: 1997a, 4).

grammatical relations do perform this function turns on the nature of the *controller* x-schema, which depicts the general structure of all higher-level motor schemas (Feldman: 2008, 230).

Here it is perhaps instructive to make a comparison with dogs. Dogs can be trained to adopt positions, fetch items, salute, perform tricks, etc., where each action is ordered with a given command. In a sense, the vocal commands are linked to the dog's motor commands. Hence, each command seems (in principle) analysable in terms of the x-schema framework, e.g. commands such as 'sit' and 'lie down' could be 'understood' by the dog in terms of the specific x-schemas responsible for those actions. Further, commands such as 'walk' or 'run' indicate that there is a degree of parametrisation, and commands such as 'fetch' imply telicity, which would indicate that these parameters are the sort that manifest as *Aktionsart* in human language. However, it seems doubtful that dogs have any representation of the generalised controller x-schema used by Narayanan in order to account for grammatical aspect – this, I suggest, is precisely because animals seem to lack the combinatorial ability characteristic of human language (one of the reasons their communication systems are 'functionally referential' – see previous chapter).

If the supra-communicative account of words as cognitive building blocks is correct, then it does not seem unreasonable to assume that functional units such as '-ing' also function as structures which *augment* our reasoning abilities. In contrast to animals, where calls or commands might be interpreted in terms of specific x-schemas, humans have the ability to modify the internal temporal structure of the verb – the *Aktionsart* – via grammar, and particularly via aspect. My suggestion here is that the controller x-schema *is* the set of units used to determine aspect – instead of linguistic units being pre-parsed and mapped onto the pre-existing controller x-schema, as in Narayanan's model, the linguistic units *are* the cognitive building blocks which serve to modify the temporal structure of the verb. The meaning of such units would then be initially grounded in specific x-schemas but, once so grounded, could be applied to other words to effect the same transformation of the event's internal temporal structure. This would imply that it is grammar which relates the aspectual modifier to the verb, facilitating the grounding of the functional unit, and it is also grammar which can relate other words to the aspectual modifier, allowing aspectual meaning to modify the meanings of words which are not those verbs which initially serve to ground the functional unit. This free relation of words to aspectual modifiers will play a crucial role in the next chapter, which returns to the concern of Heidegger's given in the introduction (above): in virtue of what is any given assertion 'brought into coincidence' with the state-of-affairs it indicates?

6. The Schematism

In the preceding chapters I have attempted to argue that certain grammatical categories are grounded in the following way: determiners are grounded in embodied deixis; aspect and verbs (and tense) are grounded in the general and specific structures of our motor processes respectively. In this chapter I wish to draw upon the work in those chapters to address Heidegger's question of what it is that allows judgement and object to 'agree' (Heidegger: 2006, H214). This question does not seem as simple as claiming that a verb simply corresponds to the action which grounds its meaning or that a given noun is constantly linked to particular objects. A moment's reflection will reveal examples of verbs which are used as nouns and vice versa: 'walk' would seem to be grounded in the (parametrised) bodily motor processes, but we nonetheless refer to 'a walk' or, if we wish to be more specific, 'the walk' or 'that walk'; during the last decade or so it has become very common to hear/use phrases such as 'Google it' or 'I'll Facebook them' despite 'Google' and 'Facebook' being originally nouns (virtual 'locations'). Hence, it seems that any attempt to explain how linguistic expressions – and particularly assertions – may be brought into coincidence with the world must be able to account for such modification of word-meaning.

My attempt to account for such coincidence follows Heidegger and, in turn, Kant by employing the notion of 'time-determination'. Kant argued that experience is made possible via the 'schematisation' of the pure categories of the understanding, i.e. their translation into temporal form. Heidegger took up Kant's notion but, given his emphasis on Dasein, viewed time itself as the source from which the categories arise – the "function" of time, says Heidegger, is to make possible our understanding of entities (Heidegger: 1988, §21). Accordingly, Heidegger described his task in *Being and Time* as "the explication of time as the transcendental horizon for the question of being" (Heidegger: 2006, H39). The first section of this chapter will explore this Kantian/Heideggerian theme of 'time-determination' in more detail.

Two subsequent sections put forward the idea that a root word may be schematised by being subsumed under an appropriate grammatical category: section 6.2 draws upon work in chapter 4 to suggest that determiners schematise embedded lexical items as objects; section 6.3 draws upon work in chapter 5 to suggest that aspect schematises embedded lexical items as events. My argument in these sections is that, first, a lexeme may be interpreted as an object when embedded within a determiner phrase or as an event when aspectualised and, second, that such embedding determines the temporal form of the lexeme, making possible the interpretation of the lexeme as an object or an event, and thereby accounting for the possible coincidence of an expression with worldly objects and/or events.

Due to grounding in embodied motor processes, the temporal patterns of aspectual schematisation are those given by the body's motor commands (as explained in more detail in the preceding chapter). By contrast, in accounting for schematisation as object (via determiners) I draw on Kant and Heidegger in suggesting that we understand objects in terms of persistence through time.

This approach is perhaps in line with Heidegger's fourth claim concerning the temporal phenomena of language (see previous chapter) – that concept formation can be given an “intelligible” account only “in terms of the temporality of discourse” (ibid., H349) – as the meaningful use of nouns as verbs (and vice versa) is achieved via a kind of time determination where a given lexical item is subsumed under the functional categories of determiner and aspect. Further, because this account is intended to form the basis for an approach to the ‘origin of truth’ (addressed in the next chapter), this approach also seems to be in line with Heidegger's third claim concerning the temporal phenomena of language – that a full explication of the “temporal characteristics of language-patterns” requires that the relation between “being and truth” is cast in terms of temporality (ibid., H349) – as ‘time-determination’ is integral to accounting for how expressions may be brought into coincidence with the world.

The fourth section revisits Husserl's theory of universal grammar and presents this version of schematisation in terms of Husserlian notions. These Husserlian concepts are used to assess the ‘indexical hypothesis’, a theory of linguistic meaning from the tradition of embodied cognition. The indexical hypothesis does attribute grammatical structure a role in meaning, however its main emphasis appears to be on pragmatics. The Husserlian account of universal grammar, along with the account of ‘grammatical time-determination’ given here, is used to suggest that prior to pragmatics is grammar structure, thereby answering the question of how modifications of meaning described above are possible.

6.1 Time-Determination

Kant's first *Critique* argued that experience is made possible by application of ‘pure’, i.e. non-empirical, concepts to sensory intuitions. Kant identified twelve pure concepts of the understanding – the *categories* – which function as “the formal conceptual conditions of all experience” (Guyer: 2010, 121), i.e. they are conditions to which all experience must conform. However, Kant also recognised the following problem. On his account, objects must be “homogeneous” with their concepts: “the concept must contain what is presented in the object that is to be subsumed under it” (Kant: 1996, A137/B176). However *pure* concepts are “quite heterogeneous from empirical intuitions” as they “can never be encountered in any

intuition" (ibid.). Hence, Kant had to account for how intuitions may be subsumed under the categories.

To solve this problem, Kant postulated "something that is third" and "homogenous with the category, on the one hand, and with the appearance [i.e. intuition], on the other hand, and that thus makes possible the application of the category to the appearance" (Kant: 1996, A138/B177). Kant argued that because *all* intuitions are temporal (though not all are spatial) these third things are 'schemata' for "the categories to be applied to appearances by means of the transcendental time determination" (A139/B178). Put more simply, because all (sensory) intuitions are temporal, each category may be translated into a temporal 'pattern' – that is, each category may be *schematised* into temporal form. Each schema, as the rule for the translation of a given category, thereby allows its category to become 'homogenous' with temporally structured intuitions. Consequently, schemata, for Kant, are essential in accounting for how experience and cognition of objects are possible.⁹²

Kant postulated twelve categories, and consequently twelve schemata, because he believed each category was a form of logical judgement⁹³ and considered logic in its Aristotelian form as "to all appearances closed and completed" (Bviii). Kant therefore grouped the schemata into those governing the determination of "magnitude" (or quantity), "quality", "relation", and "modality" (A145/B184). Magnitude schematises the pure concept of number, which Kant considers to have temporal form in virtue being "a presentation encompassing conjointly the successive addition of one item to another (homogenous item)" (A142/B182). Quality consists of 'reality', 'negation', and 'limitation': reality is the concept corresponding to "a sensation as such" and indicates "a being of something (in time)" (A143/B182); conversely, negation indicates "a not-being in time" (A143/B182); limitation, which Kant conceives as the degree which a sensation might 'vanish' or 'ascend' to "its actual magnitude" (A143/B183). Relation consists of 'substance', 'cause' and 'community': substance is schematised as the "permanence of the real in time" (A144/B183); cause is schematised as "succession insofar as this is subject to a rule" (A144/B183); community, or interaction, is schematised as

⁹² There seems to be some debate between Kant scholars over whether *all* concepts must be schematised, or whether only *pure*, i.e. non-empirical, concepts of the understanding require these 'third things'. Here I assume the latter to be true, and would rely on Guyer for the justification:

[Kant] makes it sound as if there is a numerical difference between the schema and the concept in these cases [i.e. cases of empirical concepts], but there really is not: the 'immediate relation' is in fact identity, for the concept itself is nothing but the rule for constructing or recognising instances of the concept. Only in the case of the categories do some rules not already contained in the content of those concepts themselves have to be found in order to apply those concepts to objects. (Guyer: 2006, 97)

⁹³ Kant believes that an act of 'judgement' simply *is* the application of a concept (Kant: 1996, A133/B172).

“simultaneity”, or the “reciprocal causality of substances in regard to their accidents... according to a universal rule” (A144/B183). Finally, modality consists of ‘possibility’, ‘actuality’, and ‘necessity’: the schema of possibility is said by Kant to be “the harmony of the synthesis of different presentations with the conditions of time as such” which Kant clarifies with the example that “what is opposite cannot be in a thing simultaneously, but can be in it only sequentially” (A144/B184); actuality is schematised as “existence within a determinate time” (A145/B184); necessity is schematised as “the existence of an object at all time” (A145/B184).

However, it is far from obvious that schematisation involves determination of time but not of *space*. Guyer (2006, 98) argues that, for Kant, concluding that *none* of the categories are spatially schematised is only valid if there is an additional assumption to the effect that *all* categories must apply to *all* experiences. If that assumption is not made – if some categories are applicable *only* to spatial experiences – then it is no contradiction to claim that some categories may be spatially schematised. In fact, Guyer contends that some categories, according to Kant, seem to *require* spatial as well as temporal schematisation. For example, Kant’s account of the schematisation of the pure category of ‘community’ – “the simultaneity, according to a universal rule, of the determinations of the one substance with those of another” (A144/B183) – appears to be referring to interaction between two objects existing both *simultaneously*, i.e. a temporal relation, and *at different locations*, i.e. a spatial relation (Guyer: 2006, 98). The possibility of spatial schematisation is worth noting as, from the perspective of generative grammar, the role of determiner phrases in spatial reference and the role of tense phrases in locating events in time has lead Hinzen to point to the “philosophically intriguing simplification, Kantian in flavour... that T locates in time whereas D locates in space” (2006, 177). Further, Guyer (2006, 98) points out that Kant explicitly argues certain temporal relations can only be represented via spatial relations such as a number line – “as regards time... we cannot present it to ourselves except under the image of a line insofar as we draw this line; without exhibiting time in this way, we could not cognise the singleness of its dimension” (B156). This appears to be supported by psychological evidence from Boroditsky (2000) suggesting that reasoning about time is performed metaphorically in terms of space.

Heidegger also addresses the relation between spatiality and temporality, maintaining that “Dasein’s specific spatiality must be grounded in temporality” though emphasises that this does not imply space can be ‘deduced from’ or ‘dissolved into’ time (Heidegger: 2006, H367). To see why Heidegger believes this is so, recall his account of spatiality (outlined in chapter 4, above): spatiality is primordially a matter of practical concern, i.e. equipment is

seen as having its place in virtue of our practical concerns (e.g. hammers belong on the shelf in the workshop, and the regions of the shelf and the workshop are primordially delineated, and become available for cognition, on the basis of their role in our praxis). Whilst space becomes accessible to us on the basis of concern, Heidegger argues that concern is possible only on the basis of temporality (ibid.).

Whereas Kant had investigated how cognition of objects is possible, Heidegger aimed to answer the question of how comportment towards objects is possible – “not just *cognitive* comportment but *any* comportment to entities” (Gorner: 2010, 27). Hence, Heidegger writes that “temporality is in some sense already concomitantly unveiled in all factual projection – that somewhere and somehow time breaks through, even if only in the common understanding or misunderstanding of it” (Heidegger: 1988, §21a). Heidegger was consciously following Kant, who Heidegger interpreted as claiming that schemata form the “single and ontological horizon” for any encounter with an entity – that is, schemata both make that specific encounter possible and constrain the course which that encounter might take (see Heidegger: 1997a, §22; Dahlstrom: 2010, 394). Unsurprisingly, Heidegger considered Kant’s chapter on the schematism the “core of the whole problematic of the *Critique of Pure Reason*” (Heidegger: 1997a, §23) and, as Blattner notes, the strategy of elucidating the temporal form of our access to entities “remains constant” throughout Heidegger’s work – and Heidegger acquired this strategy from Kant (2006b, 172).⁹⁴

As explained above (chapter 5), Heidegger, like the later Husserl, considered time *pre-egological* – the primordial ground from which any distinction between subject and object arises. Hence both the ‘subjective’ forms of judgement and their possible ‘objects’ are derived “from a common ancestor” (Käufer: 2003, 79), namely, temporality. As a result, for Heidegger, it is unacceptable to claim – as Kant does – that the *ego* schematises the categories, that is, that “the unity of consciousness is logically prior to the temporality of consciousness” (Morrison: 1978, 185). Put differently, Husserl and Heidegger believe, contra Kant, that the unity of consciousness is to be explained *in terms of time*, not the other way around (ibid. 198). Consequently, it is the unity of time that makes possible the formation of concepts because

⁹⁴ Käufer emphasises the extent of Heidegger’s debt to Kant:

In his 1973 preface to the fourth edition of the Kant book Heidegger writes that he noticed the temporal significance of the schematism in 1927, after having written *Being and Time*, and that the latter caused him to (mis-)read Kant as a proto-Heideggerian. This is false; the influence goes the other way around. Heidegger lectured on the temporality of the schematism in 1925/26, just before writing *Being and Time*, and his conjecture that the schematism reveals originary temporality in turn influenced the basic plan for that book. (Käufer: 2003, 86)

only from temporally ordered data may we identify any pattern of unity (Blattner: 2006b, 166) – these temporal patterns that make possible all cognition are the schemata, each of which “produces a pattern in what Heidegger calls the ‘now-sequence’ (*Jetztfolge*)” (Käufer: 2003, 83). Heidegger therefore claims that “*the origin of the categories is time itself*” (Heidegger: 1997b, 247).⁹⁵

It might be asked how such temporal patterns precede the ego, given that we surely need the ego to identify the patterns *as* patterns. However, perhaps the idea of temporal patterns preceding the ego can be fleshed out by considering the ‘binding problem’ in neuroscience and von der Marlsburg’s proposed solution to it – the ‘temporal binding hypothesis’. In order to achieve veridical perception classical theories have postulated decomposition of sensory data into features via the activation of specific neurons, each such neuron corresponding to a particular feature. A ‘binding mechanism’ is then required to bring together groups of neurons in accordance with (external) objects – properties of which the feature-neurons are representing – and thus avoid illusions such as the ‘superposition catastrophe’ where features from different but simultaneously perceived objects fuse into a single indistinct whole. The ‘binding problem’, then, is how features are correctly linked in accordance with perceived objects given that in reality the number of possible sets of neurons is “astronomically large” (von der Marlsberg: 1995). Any proposed solution to this binding problem based on ‘combination coding cells’, i.e. the interaction of any given group of cells being reflected back onto an appropriately connected single neuron, falls victim to the combinatorial explosion: “All neurons are combination-coding, but not all combinations may be coded by neurons, the number of combinations growing faster than the number of neurons” (ibid.). Conversely, neural network approaches based on Hebbian learning or associative memory appear to have extreme difficulty generalising to any sensory scene which is related on the level of intermediate groups but different in global structure (ibid.). Accordingly, Von der Marlsburg’s ‘temporal binding hypothesis’ is that “groups of cells [i.e. neurons] are bound to each other by signal synchrony on the time scale of fractions of a second” (ibid., 521; see

⁹⁵ A similar position is, arguably, present in second and third generation connectionism. First generation networks “displayed no real capacity to deal with time or order” – instead displaying a kind of “snapshot reasoning” where a single is translated into a single output (Clark: 2001, 68). Second generation networks incorporated a layer of units which function as a feedback loop that recycle some previous information from the network at one moment (t_1) and add it to the new inputs at the next (t_2). This allows processing and production of temporally extended patterns such as movement in facial expressions or motor commands for continuous/iterated movement. Third generation networks have continued this trend by placing increasing emphasis on temporal dynamics (ibid. 72).

also Buzsáki and Chrobak: 1995).⁹⁶ A key part of von der Marlsberg's explanation is his focus on neural signal fluctuations (down to the millisecond range) which have previously been ignored or dismissed as 'noise' – such fluctuations are considered by von der Marlsburg to hand down temporal fine structure over synaptic generations (ibid.). However, also integral to this explanation is the fact that "temporal segmentation is already present in the temporal *input*" and that across "all modalities, movement of objects provide natural time variations ('Common Fate')" (Von der Malsburg and Buhmann: 1992, 235, *italics mine*). The binding problem arises, then, because knowing which features pertain to a given situation is insufficient – how these features are to be grouped and bound to one another is "of fundamental importance" and such grouping and binding may be achieved by exploiting the potent source of information which are the temporal patterns in the sensory 'inputs'. Instead of postulating inbuilt organising principles, the temporal binding hypothesis thus considers the brain a *self-organising* system. Such an approach raises the possibility that our categories might be the product of such self-organisation, and hence have their origin in temporal patterns.

Returning to Heidegger, when he claims that the categories originate in 'time itself' he is not to be understood as claiming the categories originate in 'world-time' or the contentless Husserlian model of 'protention-primal impression-retention'. Rather, as noted above (see chapter 4), Heidegger is referring to 'originary time', the "manifold of nonsuccessive phenomena" which underlies world-time (Blattner: 1999, 26) and is the unity, or 'interconnection', of the following modes of comportment (Gorner: 2010, 29): 'expecting' (*Gewärtigen*), where Dasein projects itself onto a futural possibility and is therefore 'ahead-of-itself'; 'retaining' (*Behalten*), where Dasein comports itself towards what it has already been; 'enpresenting' (*Gegenwärtigen*), where Dasein lets entities emerge into unconcealedness – or, alternatively, lets entities be seen. World-time is derived from this originary time and, claims Heidegger, it is the schemata which make possible world time by producing a structured, determinate sequence of events, "i.e. time as a continuous, unilinear sequence of [meaningful] moments" (Käufer: 2003, 83). This schematisation, says Heidegger, is to be performed by originary temporality, i.e. the "basic unity" (ibid., 83). Heidegger thereby removes Kant's "logic inspired model of experience" and aims to transform schemata from "halfway houses", mediating concepts and intuitions, to the origin of the structure of experience: schemata

⁹⁶ Von der Marlsburg points to the Gestalt psychologists as important forerunners of this approach. Rock and Palmer note that although the Gestalt psychologists postulated ideas about electric brain fields which were found to be false, their "more general proposal that the brain is a dynamic system converging toward equilibrium in an energy function... may turn out to be correct" (Rock and Palmer: 1990, 90).

make possible categories and, *a fortiori*, forms of judgement. Categories are only categories insofar as they are schematised, i.e. temporally determined (ibid., 83).⁹⁷

Unlike Kant, Heidegger does not (to my knowledge) provide any systematic list or table of categories with their correlated schemata. In *Being and Time* he does identify three 'horizontal schemata': the 'for-the-sake-of-itself', which is the futural schema; the 'in-order-to', which is the schema of the present; and schema of the past, which Heidegger characterises as "that *in the face of which* it [Dasein] has been thrown and that *to which* it has been abandoned" (Heidegger: 2006, H365). In identifying such schemata Heidegger aims to disclose something more basic which makes possible world-time (ibid., H324; see also Gorner: 2010, 28). As Blattner puts it: "This suggests that the unity of the schemata themselves clarifies the unity of Dasein and world" (Blattner: 2006b, 274). Elsewhere, in *Basic Problems* (written after and initially intended to form the content of Division III of *Being and Time*), Heidegger discusses the schema of '*praesens*' which makes possible our understanding of equipment:

A being can be... encountered in our commerce with it as the being *which* it is and *how* it is in itself, only if and when this uncovering and commerce with it are illuminated by a *praesens* somehow understood. This *praesens* is the horizontal schema of the ecstasis which determines primarily the temporalising of the temporality of all dealings with the handy. (Heidegger: 1988, §21a)

Both the 'handiness' and 'unavailability' of entities are said by Heidegger to be "*specific variations of a single basic phenomenon*" – namely, *praesens* (ibid.). However, it is generally acknowledged that Heidegger never produced an adequate account of schemata: Käufer notes that Heidegger's thought on temporality is "notoriously incomplete" (2003, 80); Gorner refers to Heidegger's limited writings on the subject as "somewhat obscure" (2010, 30); Blattner points out that although Heidegger names *praesens* as a horizontal schema he not only falls short of developing an account of it (2006b, 258), but also that "there is no indication that Heidegger even saw how to spell out even *praesens* helpfully" (ibid. 261).⁹⁸ Heidegger (to my knowledge) simply does not provide any substantial account of the schemata identified in *Being and Time* or *Basic Problems*.

In this chapter I take up the Kantian-Heideggerian theme of 'time-determination'. Kant, who was concerned with how cognition is possible, argued there to be twelve categories

⁹⁷ Hence, Blattner contends that Heidegger was advancing 'temporal idealism' (see Blattner: 2006b).

⁹⁸ Blattner gives a reason why Heidegger's lecture course does not "elaborate what this horizontal schema would amount to" and why he "restricts himself to structural comments": "The semester was ending, and Heidegger was eager to make at least sketchy comments on the main themes of chapter 1 of the second part of the lecture series" (Blattner: 2006b, 261).

– and therefore twelve schemata – on the basis of Aristotelian logic (see above). Heidegger, concerned with how comportment is possible, gave no definite list of schemata (though perhaps his point was that temporal schemata make possible the emergence of the categories; that Dasein is self-organised). Here I draw on the research from generative linguistics to suggest that schematisation – ‘time-determination’ – occurs through the categories of determiner and aspect. Hinzen (2006), following Grimshaw (1991), emphasises that functional categories – such as aspect – do not select arguments in the way that lexical categories, e.g. verbs, do. Rather, functional categories such as determiners or aspect stand in relations to lexical categories: “Even at the top of a syntactic tree, that is, in both the nominal and the verbal domain, we remain intimately related to the lexical categories N and V” (Hinzen: 2006, 174). The conjecture I explore in this chapter is that these lexical domains (N and V) – the domains of object- and event-cognition – are made possible via grammar’s translation of a lexeme, i.e. a word ‘root’, into specific temporal forms and that this translation is achieved through the functional categories of aspect and determiner.

These categories were explored in chapters four and five respectively, and were there suggested to be grounded in embodied deixis and the structure of our motor processes. Whilst those chapters were more Heideggerian in flavour, this chapter is more Kantian. Although I argued the categories are *grounded* in our embodied being-in-the-world, i.e. our ‘comportment’, our linguistic use of these categories in object- and event-reference appears to involve a ‘higher’ cognitive ability irreducible to embodied being-in-the-world. Hence, the following two sections reinterpret the categories analysed in the previous two chapters – determiner and aspect – as being temporal patterns which, in Heideggerian vein, make possible our comportment. However, in Kantian vein, these sections argue that lexical items may be grammatically schematised as objects and events via the categories of determiner and aspect respectively, thereby making linguistic reference to objects and events possible.

The following section discusses the determiner-category and, although I will acknowledge the importance of space, I will follow both Kant and Heidegger in arguing for the primacy of time, and therefore that schematisation is primordially temporal – that temporal features of meaning appear to be necessary, whereas the spatial features either need not be or may assume metaphorical meaning. Following this, I will discuss aspect, defined in linguistics to be the internal temporal structure of an event. In the spirit of existential phenomenology and embodied cognition, I will suggest that because this temporal structure is the form of our motor processes which make possible our embodied comportment. However, in a more Kantian spirit, I will also suggest that grammatical structure, irreducible to

embodiment (see chapter 3, above), allows us to conceptualise events that otherwise might lie beyond outside our cognitive capacities.

6.2 Determiner and Object

The meaning of determiners was argued above (see chapter 4) to originate in embodied, deictic pointing (conspicuous by its absence in other species). Heidegger, as noted above, claimed that “Dasein’s specific spatiality must be grounded in temporality” (Heidegger: 2006, H367) and that “*the origin of the categories is time itself*” (Heidegger: 1997b, 247). Heidegger appears to be arguing that spatiality – in this instance, our pointing to an object – presupposes certain temporal patterns that allow us to engage with objects in the first place. Kant argued that the object-schema is ‘persistence through time’ and, presumably, *that* objects persist through time is a precondition for any (spatial) comportment towards them. In this section I will suggest that the determiner phrase schematises the lexeme embedded within it, i.e. the determiner makes a lexeme understood *as* an object by making it understood in terms of temporal persistence.

An immediate complication with the account of the object-schema as ‘persistence through time’ is that whilst it seems to apply to the visual⁹⁹ and tactile modalities, it is unclear how it applies to the olfactory modality and it does not seem obviously applicable to the auditory modality. Regarding the olfactory modality, we may smell an object but the persistence of that smell does not seem to indicate the persistence of the object in the manner that continuous visual or tactile ‘data’ does – smell might linger, for example, after the object itself is gone (either absent or possibly destroyed).¹⁰⁰ Regarding the acoustic modality, it is certainly true that we may perceive an object via the persistence of noise emitted by that object, but it is also true that, first, many objects are simply silent with noise emitted only when, say, that object is struck and, second, many objects that emit sound are not *perceived* via this sound – a stereo, for example, emits sound in the form of music but it is the *music* we perceive, *not* the stereo. However, this ‘multi-modal’ complication does not seem to undermine the idea of the object-schema as persistence throughout time. For a start, this understanding of an object as something that persists through time appears unproblematic in cases of visual and tactile perception where we see or feel something then move away so we cannot see or touch it. We tacitly assume we may return to this object, or assume that under normal circumstances the object persists even if it is moved without our

⁹⁹ Kant’s account of schemata appears to concentrate on the visual modality. Heidegger’s account, as commentators have noted (see above), does not seem to have been developed enough to be give an indication about whether different sensory modalities were an important issue for Heidegger.

¹⁰⁰ Perhaps this part of olfactory perception is far more relevant for dogs than it is for us.

knowledge. Additionally, if the object is destroyed – so we can see or feel either nothing of it or only its remains, but not the object itself – we understand it as something that *no longer* is. Equally, in the example from the auditory modality of striking an object to make a sound, it is tacitly presupposed repeating the strike will repeat the sound – our understanding of it as an object is as something which will continue to be there for us to engage with and act upon.¹⁰¹

If determiners are founded in embodied deixis, and if spatiality presupposes temporality, it would seem to follow that determiners are ultimately traceable to temporality, even if they cannot be ‘deduced from’ or ‘dissolved into’ time (Heidegger: 2006, H367). Hence, linguistic deictic indication of objects appears to be possible because the determiner phrase ensures that the lexeme embedded within it is understood as something with temporal persistence. The lexeme thereby assumes a temporal form which is, in Kant’s terminology, ‘homogenous’ with the temporal form of the object and for this reason the determiner phrase ‘the hammer’ may be used to refer to a given hammer. Referring to ‘the hammer’ as opposed to ‘hammering’ (i.e. the activity of hammering), or referring to ‘these hammers’ as opposed to ‘hammers’ (i.e. ‘hammers in general’ rather than a specific set of hammers) is to make the lexeme ‘hammer’ interpretable with a temporal persistence. The case of ‘hammering’ has a different temporal structure than persistence (to be discussed more fully in the next section on aspect and events) whilst the case of ‘hammers’ (in general), lacking a determiner, appears to be *a-temporal*.

These considerations arguably bear on Heidegger’s classification of “being and its modes and characteristics” according to their type of temporality (ibid., H19). In *Basic Problems* (1988, §21), Heidegger distinguishes temporal and a-temporal beings. The former encompasses any entity which is “running its course in time”, i.e. “which only sometimes is, [and] sometimes is not”, whereas the latter is anything that is not so changeable, either because it is “timeless”, such as the number ‘3’, or because it is “supra-temporal”, such as God.

¹⁰¹ Although I will not pursue the multi-modal complication here, there it is perhaps also worth mentioning that Fitzpatrick and Arsenio (2004) programmed Brooks et al.’s (1999) Cog robot with a binding algorithm that is capable of using cross-modal (i.e. visual, acoustic, and proprioceptive) temporal patterns in order to ‘learn’ about itself and its environment: “repetitive synchronised events are ideal for learning since they provide large quantities of redundant data across multiple sensor modalities” (Fitzpatrick and Arsenio: 2004, 62). Fitzpatrick and Arsenio’s algorithm operates within the ranges of 0.1Hz to 10Hz, i.e. the frequency range within which human perception and action occurs. Any repetitive signal within this range are interpreted as ‘events’ – hence waving a flag and walking are events, but the vibration of a violin string is too fast and the rising and setting of the sun is too slow (ibid., 60). The period of the signal is estimated and signals are grouped into ‘clusters’ based on their periodicity. Clusters from different modalities, e.g. visual and acoustic, are bound together if their periodicity ‘matches’ (with suitable error margins). This binding process allows, e.g., auditory and visual information to aid identification of objects in the surrounding environment: “Is there a loud bang at the extreme of a physical trajectory? Then we might be looking at a hammer. Are the bangs at either extreme of the trajectory? Perhaps it is a bell” (ibid., 62).

Heidegger maintains that both “the ‘non-temporal’ and the ‘supra-temporal’ are ‘temporal’ with regard to their being” (ibid., H18); a-temporal beings are still understood in terms of temporality precisely because they are understood as *a*-temporal. Heidegger here appears to be primarily concerned with ontology, discussing the temporal nature of the entities themselves as opposed to how the entities are conceived – the more Kantian concern which I am engaged with here.

Nonetheless, the difference between a phrase such as ‘all hammers are useful’ and ‘hammers are useful’ might be explained in terms of a Heideggerian distinction between temporality and a-temporality. To say ‘all hammers are useful’ is to talk about every object that is a hammer, and to conceive of the hammers *as* objects is to conceive of them as temporally persisting. Hence the phrase ‘all hammers’ may be brought into coincidence with all actual hammers. As a result, it seems that finding a useless hammer (say one that is made from inappropriate material) might refute the statement ‘all hammers are useful’. However, the expression ‘hammers are useful’ seems to be different – finding a particular useless hammer does not seem to refute the expression, as the phrase is making a point about something more nebulous: hammers-in-general.

Importantly, whether the hammers *themselves* – the actual objects indicated – are currently instantiated in time, i.e. whether the objects exist, is a different matter. We may use determiner phrases such as ‘the hammers’ to indicate a non-existing set of hammers that are the topic of our speech, and these hammers might be non-existent because they are imaginary (such as those possessed by the Dwarfs in the Snow White fairytale), or they might have existed at one point in the past or will exist at some point in the future but do not exist at present. In case of imaginary or fictitious objects, it still seems to be the case that in order to conceive of them as objects we must conceive of them with temporal persistence so that the characters in the story might use, act upon, or return to them at any point. In the case of objects that have existed or are yet to exist, we may use tense to place the objects at a certain point in time, be it in the future or past, but this does not seem to change that in order to conceptualise the entities *as* objects we must suppose that they were, are, or will be persisting through time – the ‘location’ of this temporal persistence is therefore altered through tense, but the notion of temporal persistence remains integral to the conceptualisation of something as an object; conceptualising the temporal location of that object is a different matter.

Because hammers might be or might not be instantiated in time they fall within Heidegger’s definition of temporal entities. However, this ontological fact aside, it seems

possible to *conceptualise* hammers not only as temporally persisting, such as when we say ‘these hammers are tools’ but also as a-temporal, such as when we utter an expression like ‘hammers are tools’ to comment on a general fact about hammers, independent of all actual or hypothetical instances of them (and irrespective of the expression’s truth or falsity). Importantly, the idea is *not* that a determiner forces us to think about something for a duration, but that the schema of persistence through time makes possible our comportment toward objects and that understanding something *as* an object is to understand it in terms of temporal persistence. By subsuming a lexeme within a determiner phrase we schematise the root word as persisting through time, allowing the lexeme to be interpreted as an object and opening up the possibility of the expression being brought into coincidence with an actual object. As pointed out above, where there is no determiner, e.g. ‘hammers’, the word means something more nebulous, ‘hammers-in-general’.

If true, this implies that the category ‘D’ is ultimately grounded in objects’ instantiation in time and that determiners schematise the lexeme as persistence in time. This seems loosely analogous to Kant’s schema of ‘reality’ which “indicates a being of something (in time)” (A143/B182). However, in contrast to Kant’s suggestion that ‘reality’ is grouped with ‘negation’ and ‘limitation’, this analysis implies a ‘binary’ distinction: if there is a determiner, the lexeme is schematised as an object; if the phrase lacks a determiner, the lexeme cannot indicate any object and instead denotes an a-temporal class.

Determiners such as ‘that’, ‘those’, ‘this’ and ‘these’ also seem to be grounded in spatial elements of meaning, as argued above (see chapter 4). Observing these spatial aspects of meaning might allow an interpretation of an interesting linguistic phenomenon which might otherwise create difficulties for my account. ‘Determiner spreading’, found in (at least) Greek, can be observed in the following examples (with the determiners given in bold – examples taken from Hinzen and Sheehan: forthcoming, 114):

Afto to vivlio

This the book

This book

To vivlio **to** kokino

The book the red

The red book

***To to** vivlio

***To** afto vivlio

As Hinzen and Sheehan note, this appears to be an instance of “doubling the phase edge” (ibid.) and it creates an immediate difficulty for the account of time-determination presented here: if the determiner phrase performs time-determination, why are there two determiners? Presumably, it is inconceivable that a root could be ‘doubly-schematised’, i.e. that we could understand a given root as *simultaneously* taking two temporal forms or taking the same temporal form twice. At this point it is helpful to recall two points from the previous section: first, Guyer’s argument that Kant gave no reason why some categories, applying only to spatial experiences, might not be temporally *and* spatially schematised (2006, 98); second, Hinzen’s “philosophically intriguing simplification” that the determiner category “locates in space” (2006, 177). Determiner spreading might be accounted for, then, in that one determiner (‘afto’) carries spatial meaning whilst the other (‘to’) performs time-determination (whereas the English ‘this’ performs both spatial and temporal meanings). Hinzen and Sheehan advance an argument similar to this, claiming that “the deictic effect increases as we move to the [phase] edge... serving to make reference more specific” (forthcoming, 114).¹⁰² In this regard, we should note that *Afto vivlio¹⁰³ is ungrammatical, implying that an essential moment of the DP’s meaning is absent and that spatial deixis – added by the morpheme ‘afto’ – is not sufficient to give a lexeme a complete meaning. Rather, in order for a root word to indicate an object it must be understood in terms of the appropriate temporal structure. The spatial part of the meaning does not seem essential to phrases that indicate objects – although English determiners such as ‘this’ and ‘that’ are spatial and may be used without other determiners, the nearest Greek equivalents are ungrammatical if used without another determiner, ‘to’. Assuming the account of time determination given here has some validity, an interpretation of this phenomenon is that the English determiners may both spatially indicate the root word *and* schematise it as persisting through time, whereas the Greek determiners do one or the other. The conjecture, then, is that in Greek ‘to’ serves to schematise a lexeme as an object, and ‘afto’ serves to locate it in space – in English, by contrast, a determiner such as ‘this’ may perform both roles.

Another potential problem with this account might be that we can employ demonstrative deictic reference that does not actually indicate any spatial material object at all. However the spatial moments of the determiner phrase need not always be taken literally

¹⁰² Similarly, perhaps, it has been suggested that determiner spreading involves the category of definiteness, i.e. the functional head ‘def’ with a defP projection. Postulating the definiteness category has been challenged on both theoretical and empirical grounds, though even if there is no separate functional category it seems to be the case that “this particular construction owes its existence... at least to particular properties of determiners in Greek” (see Panagiotidis: 2008, 450).

¹⁰³ Thank you to Andreas Pantazatos for an extensive discussion on this grammatical phenomenon in Greek.

and are often used metaphorically. ‘The idea’, ‘this idea’, and ‘that idea’ all seem to present an abstract entity as something persisting through time that we can inspect, analyse, evaluate, etc. ‘Ideas’ are obviously not spatial entities, in the sense that they are physical objects in the world which we may point to in the same way that I may point to my computer.¹⁰⁴ Nonetheless, when ‘idea’ is the complement of ‘this’ or ‘that’ the spatial meaning of the determiner is highly relevant, metaphorically serving to delineate which idea it is that we are discussing – in distinguishing *this* idea from *that* one, spatial ‘nearness’ and ‘farness’ is adapted to make clear the topic of our discussion.

This section so far has aimed to take up the ideas given above (see chapter 4) that determiners are grounded in embodied deixis and suggest that the determiner phrase schematises the embedded root word as an object, i.e. something persisting in time. This temporal meaning appears to be essential in order to indicate an object, whereas the spatial moments of the determiner phrase’s meaning are ‘optional’, either in the sense that a determiner may be used which has no obvious spatial meaning (e.g. ‘the’, ‘a’) or in the sense that the spatial meaning might be metaphorical (in the case of delineating abstract concepts). However, although I have been suggesting that determiners schematise lexemes as objects, it is necessary to acknowledge a significant problem which arises with the category of number. According to the cartographic project in generative grammar – which aims to ‘map’ the hierarchy of grammatical categories – number lies *beneath* determiners in grammatical structures. Number phrases (NumP) are therefore embedded *within* determiner phases (DP):

[_{DP} This [_{NumP} single hammer]]
 [_{DP} A [_{NumP} single hammer]]

[_{DP} Those [_{NumP} three hammers]]
 [_{DP} Any [_{NumP} three hammers]]

It might be that the number phrase has already forced the lexeme to be interpreted as a ‘thing’. Number phrases such as ‘two hammers’ or ‘two kicks’, irrespective of whether the lexeme’s meaning is grounded in our interaction with a tool or in our motor processes, appear

¹⁰⁴ However, there are some qualifications which perhaps should be made regarding this. First, there are metaphysical/ontological issues regarding *what* an idea actually is – some entity occupying Frege’s third realm, a pattern of neural activity, etc. – which I will not discuss here, and which do not seem relevant to the observation that, regardless of what sort of things they are, it is a different sort of existence than that of physical objects such as a book or a car. Secondly, the word idea may be used metaphorically to refer to a spatial object, such as when an architect points to building and refers to it as their idea. Again, I do not have metaphorical uses of the root word in mind (it is those of the determiner are under discussion) but it should still be noted that in this latter case it is the determiner which makes such reference possible.

to be incompatible with aspectual modification (*two hammering' or *two kicking'). This raises the question of whether the category of number schematises the lexeme as an object *prior* to the determiner phrase.

Kant maintained that number is a pure concept of the understanding, "a presentation encompassing conjointly the successive addition of one item to another (homogenous item)" (A142/B182), and schematised via 'magnitude'. However, Kant's argument that magnitude schematises number because "I myself produce time in apprehending the intuition" (A142/B182) appears to be problematic – as Guyer points out, although "it might take us some time to perform the operation of addition", this fact "seems irrelevant to the abstract concept of enumeration" (2006, 98). Guyer notes that number can only be applied to those objects which can be counted (*ibid.*, 99) and therefore we might ask whether it is possible, *contra* Kant, that number, in quantifying the embedded lexeme, schematises it as an object (as opposed to being the concept schematised)? If so, my suggestion that determiners schematise lexemes as objects seems problematic as this might occur prior to the determiner phrase with the category of number.

Without grammatical number, a word such as 'hammer', verbal reading aside, seems to convey an abstraction and could be used in an expression such as 'He is more hammer than anvil' (see Hinzen and Sheehan: forthcoming, 120). Grammatical number, even without a numeral, appears allow a lexeme such as 'hammer' to denote hammers-in-general, and so the word is not in coincidence with actual objects. This appears to hold true when numerals are involved: the phrase 'three hammers' alone does not seem capable of being brought into coincidence with actual objects in the manner that phrases such as 'these three hammers' or 'any three hammers' do.¹⁰⁵ Rather, the numeral appears to constrain the size of the set – in this case, limiting it to three – and indication of objects requires a determiner such as 'these' or 'any'. Hence, one possible solution to this problem might be to draw a rather crude distinction between 'thing' and 'object'. Whilst number might be related to produce understanding of a set of things, such phrases by themselves do not seem capable of indicating objects – the understanding of the lexeme remains a-temporal unless a determiner is employed. In Kant's jargon, a lexeme within a number phrase is not yet 'homogenous' with objects and is therefore incapable of indicating them. If this is true, then the number category

¹⁰⁵ However, a phrase such as 'three hammers' could be brought into coincidence with three objects should it be accompanied with an embodied point. In this case the embodied point performs the role the determiner would have to have done – as argued in chapter 4, determiners are grounded in such embodied deixis and hence the same grammatical relation is in play.

is not concerned with time-determination but instead serves to quantify what is to be so determined.

6.3 Aspect and Event

As noted above, both Hinzen (2006) and Grimshaw (1991) emphasise that functional categories, such as aspect, seem inseparably bound to lexical domains – in the case of aspect, it seems inseparably linked to the verbal domain. That functional categories operate on lexemes has also been recognised by cognitive linguists. Bergen and Wheeler, for example, draw a distinction between ‘grammar’ and ‘content words’ which appears to parallel the generative distinction between functional and lexical items respectively:

The... effects of grammar on mental simulation are qualitatively different from the effects of content words. Whereas content words like *Mary*, *drawer*, or *open* point to specific experiences or categories of experience that can be simulated, grammatical aspect markers – and perhaps some other grammatical constructions – do not provide simulation content themselves. Rather, they appear to operate over the representations evoked by content words, modulating, for example, what part of an evoked simulation an understander focuses on, or the grain of detail with which the simulation is performed. (Bergen and Wheeler: 2009, 6)

In both traditions, grammar or functional categories – amongst which is aspect – operate on content-words or lexical items. In the previous section, I suggested that the linguistic indication of objects is possible because of the schematisation of the lexeme via the determiner phrase, e.g. ‘this hammer’. Here, in similar fashion, I suggest that lexemes may be schematised as events by being aspectualised, e.g. ‘hammering’. In chapter 5, aspectual meaning was argued to be grounded in the structure of our bodies’ motor processes, however here I emphasise that aspect pertains to an event’s internal temporal structure and suggest that schematising a lexeme as an event requires translating it into the appropriate temporal structure via aspect.

The effects on meaning investigated by Bergen and Wheeler emphasised “what part of an event the understander focuses on” (2009, 6) as opposed to temporality. One cognitive linguist who has explicitly discussed aspect in terms of temporality is Langacker, who divides English verbs into two classes, perfective and imperfective (1990, 86): the perfective is defined as “the extension through time of a stable situation”; the imperfective as “a situation as changing through time”. Langacker’s distinction is therefore grounded in our basic ability to perceive change (or lack thereof). Langacker’s distinction between perfectives and imperfectives seems to parallel Vendler’s distinction between states and non-states (1967, §4.3; see also chapter 5, above), and Langacker uses the same diagnostic test as Vendler to

identify a verb as a perfective/state or imperfective/non-state: perfectives/states do not, according to Langacker, appear in the progressive aspect (it is fine to say ‘I know’ but it sounds odd to say ‘*I am knowing’); imperfectives/non-states, however, may appear in the progressive aspect (‘I am running’ is unproblematic). Langacker accounts for this by claiming that the semantic effect of adding ‘-ing’ to a verb stem is to “convert a process into an a-temporal relation” (1990, 91) which, to form the progressive, must be ‘retemporalised’ by the word ‘is’ (i.e. ‘is V-ing’). Since Langacker considers states ‘a-temporal’ in the sense that they portray a relationship as “stable through time” (ibid., 92), having states in the progressive would be superfluous in that states are already a-temporal (in Langacker’s sense) and do not need to be made so by the progressive. The account of aspect as grounded in the generalised structure of x-schemas, outlined in chapter 4 (above), suggests an alternative analysis to that of Langacker.

A phenomenon which at first glance might corroborate Langacker’s claim that verbs become a-temporal through the ‘-ing’ suffix – though I will suggest below that this need not actually be the case – is abstract motion, investigated extensively by Matlock (2010), where motion verbs are used by speakers to depict static spatial arrangements in utterances like ‘The mountain range goes from Mexico to Canada’ or ‘The tattoo runs down his spine’. Matlock notes that although motion appears to be inherently progressive it can seem odd to use the progressive for *abstract* motion. For example, saying ‘The mountain range goes from Mexico to Canada’ is acceptable whereas ‘The mountain range is going from Mexico to Canada’ sounds bizarre (2010, 256). A progressive utterance such as ‘John is going from Mexico to Canada’ involves conceiving of a person as journeying across a distance, and therefore sounds absurd when the subject is changed from ‘John’ to ‘The mountain range’ (which implies the mountains themselves are marching from Mexico to the Great White North). Equally, the perfective ‘John goes from Mexico to Canada’ is odd because it would imply that John has somehow been ‘stretched’ across the United States to reach from one country to another (however the statement may be interpreted in the habitual aspect and taken to imply that John regularly makes a journey from Mexico to Canada – conversely, interpreting ‘The mountain range goes from Mexico to Canada’ as habitual also seems absurd). Matlock’s results therefore seem on the surface to dovetail with Langacker’s claim: that the mountain range runs from Mexico to Canada is a state, involving the extension of a stable situation through time, and, in line with Langacker’s prediction, the examples so far have been ungrammatical in the progressive aspect.

Interestingly, using a progressive verb to describe abstract motion seems perfectly possible when that progressive is ‘fronted’. It is, for example, acceptable to say ‘Going from Mexico to Canada, the mountain range is a barrier for those travelling to the west coast’. Abstract motion appears to be involved here despite that the spatial arrangement of the mountains is static: the phrase, like other instances of abstract motion, seems to involve a *perspective* in motion which allows distance to be conceptualised via this motion, i.e. the phrase might conjure up a first person perspective moving over the static mountain range (or, using Matlock’s alternative example, following a tattoo down the length of someone’s back). Fronting the verb also appears to be possible with (non-motion) verbs such as ‘know’, e.g. ‘Knowing that you are ill, I thought I’d bring you some grapes’, despite such verbs being classic examples of perfectives/states. When a verb conveying a state is fronted, I suggest (following Matlock) that we are induced to take an ‘internal’ perspective on the state, conceptualising it as ongoing and providing a context within which the later part of the statement is understood – in this example, the bringing of the grapes is understood as occurring ‘within’ the state of knowledge that someone is ill. Such a perspective seems to be made possible by conceiving of the state as having a continuing temporal duration – temporal duration thus appears integral to the interpretation.

Such examples seem to speak against Langacker’s claim that the ‘-ing’ suffix involves the verb’s α -temporalisation until retemporalised by ‘is’ (or ‘was’ or ‘will be’).¹⁰⁶ Contra Langacker, it seems a mistake to account for the meaning of the perfective by emphasising the *stability* of a state through time – rather, we should focus on the temporal continuity which the progressive aspect provides. If Aktionsart and aspect are grounded in the body’s motor processes and have their general structure formally depicted with the ‘controller x-schema’ (see chapter 5, above), then such abstract motion might be understood as a ‘process’, i.e. something very much temporal. Hence, an example such as ‘the mountain range runs from Mexico to Canada’ may be understood as a process to be terminated once the ‘goal’ – Canada – is reached. Assuming that (something like) the analysis of aspect as grounded in the structure of the bodies’ motor commands is correct (see chapter 5, above), then phenomena such as abstract motion are also made possible by grammar’s mapping of the lexical and functional parts of the utterance to the relevant nodes of the x-schema. On this account, specific x-schemas may be embedded within the nodes of the controller, allowing various

¹⁰⁶ Additionally, this restriction on the use of the progressive aspect noted by Langacker (and, arguably, Vendler) appears to be restricted to the use of the progressive within a *proposition*. However, progressives may be embedded within a determiner phrase, e.g. ‘the mountain range running from Mexico to Canada’ or ‘the tattoo running down his spine’.

aspectual modifications to occur and thereby enabling a verb such as ‘know’, which Langacker would refer to as inherently perfective, to be conceived as ‘ongoing’.

One of Heidegger’s contentions was that we are not primordially aware of time as a series of contentless, insignificant moments but rather that temporal periods are differentiated in virtue of our practises. In chapter 5 (above) I suggested that the structure of this ‘world-time’ is traceable to the structure of our embodied action. In this section I wish to extend this and theorise that aspectualising a lexeme is to schematise it with a temporal form, i.e. the temporal structure of embodied action, which enables expression of events. Due to grammar, we may apply these temporal forms to events which lie beyond our perceptual powers. For example, although in the case of abstract motion it sounds odd to say ‘the mountain range is going from Mexico to Canada’ this utterance might make sense in the case of geographical phenomena, e.g. tectonic plate activity resulting in a mountain range gradually – imperceptibly slowly – moving north. Although our perceptual faculties might treat certain aspects of the environment as invariant, we may nonetheless conceptualise such ‘invariants’ as in motion through language. Hence, grammar can relate symbols, whose meaning is grounded in temporally ‘invariant’ objects, to an aspectualised verb allowing the invariants to be conceived, though not perceived, as actually being of a different temporal structure, e.g. a perceptually ‘solid’ mountain range may be conceived of as in transit.

It is also important to note that in addition to aspect, the verb’s Aktionsart, or inherent aspect, is also important when speaking about an event. Vendler pointed out that the Aktionsart of different verbs must ‘agree’, contrasting ‘I saw him cross the street’ with ‘*I spotted him cross the street’ and explaining the acceptability of the former in terms of the differing Aktionsart of ‘see’ and ‘spot’: the former is not punctual and therefore does not conflict with crossing the street, which has temporal duration; the latter is punctual, or instantaneous, and therefore conflicts with the temporally extended crossing of the street (see Vendler: 1967, §4.6). This seems to indicate that the temporal structure of all the verbs used to describe an event must ‘agree’ with the temporal structure of the perceived event.

This raises the question of the interaction of aspect with a given verb’s Aktionsart. In the previous chapter, I cited Narayanan’s explanation of how certain events may be conceived of as punctual or durative in terms of the x-schema framework. According to Narayanan (1997a, 110-1) the acceptability of words as ‘coughing’ (to refer to a single cough) or phrases such as ‘I am spotting...’ depends on the ‘intrinsic duration’ of the action (s_i) as represented in the underlying x-schema, and the ‘reference time scale’ (s_R). Because the duration of action such as ‘cough’ or ‘spot’ is on a different order than the reference time scale of our normal

experience, the actions are considered punctual. By contrast, the duration of an action such as 'see' is on the same order as the reference time scale of our normal experience and hence the action is durative. Hence, although it usually sounds odd to say 'I am spotting him' or 'I was coughing' (to refer to a single cough) if the reference time is altered – say, we are watching a recording of myself observing another or coughing once, and this recording is being played in slow motion so that my act of 'spotting him' or 'coughing' has longer temporal extension – then the progressive '-ing' may be used to denote a 'process' in the continuous aspect, i.e. a parametised action (encapsulated by the verb) that is 'in progress'.

Although the environmentally given reference-time may be altered under certain conditions, it seems to be the case that in normal experience the English imperfective morpheme '-ing' produces the continuous or the iterative aspect depending on verb's Aktionsart: verbs which are not inherently iterative (e.g. 'go') are made continuous; verbs which are inherently iterative (e.g. 'walk') are made iterative. The continuative aspect seems to schematise the lexeme as being an action of indefinite temporal extension. The iterative aspect seems to schematise the lexeme as regular repetition the main action of the verb, for example 'I am running' implies repeated parametised movement specified by the x-schema. According to Matlock, from the perspective of cognitive linguistics, these imperfective aspects require more action to be processed than the perfect aspect does precisely because of the imperfectives' focusing on the "ongoing nature of events and... attention to the details of the situation as it is happening in time" (Matlock: 2010, 255). In support of this, Matlock cites the results of an experiment where subjects were asked to read either a perfective – 'Bob planted pine trees along his driveway last week' – or a progressive – 'Bob was planting nine pine trees along his driveway last week' – and asked whether these descriptions were acceptable English sentences. Following this, subjects were asked to estimate the length of the drive. It was found that those who read the progressive description tended to give longer driveway estimates than those who had read the perfective, implying descriptions in the progressive aspect lead subjects to conceptualise the path with greater linear extension and consequently that the progressive aspect requires greater processing (Matlock: 2010, 256).

Closely related to the iterative aspect is the habitual, which is regular repetition of an entire x-schema. Hence 'he used to run' implies repetition of the complete event of running. Hence the habitual makes use of the same temporal structure as the iterative, however the two aspects differ in what it is that they schematise regular repetition with: the iterative schematises the (parametised) main action as regular repetition; the habitual schematises the complete event as regular repetition.

6.4 Prior to Pragmatics: Universal Grammar

As noted in the introduction (see above), Husserl, like generative linguists, upheld the 'Cartesian' distinction between a 'core' realm of meaning on the one hand, and grammar on the other. Husserl writes of "the grammatical distinction as *expressing* a certain essential semantic distinction" (Husserl: 2001b, IV §4 *italics mine*) and claims that "expressions in communicative speech... serve the hearer as *signs* of the 'thoughts' of the speaker, i.e. of his *sense-giving* inner experiences" (Husserl: 2001a, I §7 *italics mine*). For Husserl, then, "it is an a priori truth" that "there must be a semantic form which corresponds to each presentational form" (Husserl: 2001b, IV §4).

Husserl's theory of meaning-forms in the fourth *Logical Investigation* is an application to "the special sphere of meanings" of his mereological distinction given in the third *Investigation* "between dependent and non-independent objects... so that the distinction... may be called that of independent and non-independent meanings" (ibid., IV). Non-independent meanings require 'completion' and "may only occur as 'moment' of certain independent ones" whereas independent meanings are 'complete' in themselves (ibid., IV §5). For example, words such as 'man' and 'king' are thought by Husserl to express independent meanings whereas those such as 'and' and 'or' to express non-independent meanings. Correlatively, in language, Husserl distinguishes between 'categorematic' and 'syncategorematic' expressions.

Categorematic expressions are those expressing independent meanings whereas syncategorematic expressions are "the linguistic expression of non-independent meanings [and therefore] may function only as formal constituents in expressions of independent meanings" (ibid., IV §5), i.e. they must occur with a more complex categorematic expression. Being expressive of non-independent meanings, syncategorematica "require some sort of completion" (ibid., IV §6). However, Husserl makes clear that syncategorematica are not restricted to simple, 'functional' units – like conjunctions or tense markers – but can also be extended to complex units which may include categorematic units as parts but which nonetheless express a non-independent meaning:

Meanings such as, e.g., *larger than a house; beneath God's own sky; in life's troubles; but, Lord, to give thy messengers due honour*, are non-independent meanings, *unitary* despite their plurality of discernable parts. Several non-independent meanings, or meanings partly non-independent and partly independent, can be accordingly associated *in relatively closed units*, which yet manifest, *as wholes*, a character of *non-independence*. This fact of complex non-independent meanings is grammatically registered in the relatively closed unity of complex syncategorematic expressions. (ibid., IV §6)

Syncategorematic expressions, then, are still ‘understandable’ in that they carry ‘moments’ of meaning “that look forward to a certain completion” (ibid., IV §5), however they cannot “*function in knowledge outside of the context of a categorematic meaning*” (ibid., §9b). Additionally, syncategorematic expressions should not be confused with ‘defective expressions’ such as when someone’s voice trails off mid-speech due to a distraction (ibid., IV §6). Defective expressions, to adopt Chomsky’s terminology, pertain to performance. By contrast, the concept of syncategorematic expressions pertains to a formal distinction in the realm of meanings independent of their expression.¹⁰⁷

Having established these distinctions, Husserl emphasises there are a priori laws restricting the combination of simpler meanings into more complex meanings: “we cannot juggle at will with the elements of a significantly given, connected unity” (ibid., IV §10). Husserl claims that an expression such as ‘the tree is green’ is a particular instance of a more general “pure form of meaning [i.e. ‘S is P’]... whose range of values consists solely of independent (propositional) meanings” (ibid., IV §10). According to Husserl, ‘S’ may be substituted for phrases such as ‘The tree’, ‘This gold’, ‘This algebraic number’, ‘This blue raven’, etc., and P may be substituted for “any adjectival material”. By contrast, the restrictions may be seen in expressions such as ‘This careless is green’ which do not yield a ‘unified’ sense despite each individual word being ‘significant’. From these sorts of examples Husserl concludes that “where we have materials from... other categories, other material of the same kind can be put, i.e. always material from the same category and not from another. This holds of all meanings whatsoever, whatever the complexity of their form” (ibid., IV §10).¹⁰⁸

Further, Husserl points out that ‘modifications of meaning’ may result in words occupying a position in a meaning-form which they otherwise would not do. For example, returning to the case of ‘S is P’, words such as ‘and’ or entire propositions such as ‘The earth is round’ usually make no sense if substituted for ‘S’, ‘*and is green’ or ‘The earth is round is green’, though the word may occupy the ‘S’ position *if* its meaning is altered, e.g. “‘And’ is a conjunction’ or “‘The earth is round’ is a statement’. However in such cases the words and phrases are not functioning as they did in isolation but rather are naming themselves as linguistic expressions. Such modifications are said by Husserl to be rooted “*in the ideal nature*

¹⁰⁷ The formal concept of the ‘syncategorematica’ is not thereby analogous to Chomsky’s notion of ‘competence’. ‘Competence’ is a psychological concept relating to the speaker’s tacit knowledge of their language independently of their ability to ‘externalise it’ (i.e. performance). Husserl, in identifying the categorematic/syncategorematic distinction as *formal*, is *not* pointing to something psychological.

¹⁰⁸ Bar-Hillel notes that whilst Husserl’s insight is “not spectacularly deep and revolutionary” it might well “have been expressed here [i.e. *Logical Investigations*] for the first time” (1957, 364).

of the meaning-realm itself” and performed in a manner “not unlike that of... ‘transforming’ arithmetical patterns” (ibid., IV §11).

Husserl therefore claims that: “In the realm of meaning there are *a priori* laws allowing meanings to be transformed into new meanings whilst preserving an essential kernel” (ibid., IV §11). Although he does admit certain cross-linguistic differences and restrictions on what may be said, Husserl believes an essential part of the explanation of why certain verbal combinations are (im)possible concerns “the essential difference of independent and non-independent meanings and, closely involved therewith, the *a priori* laws of combination and transformation of meanings” (ibid., IV §12). A theory of universal grammar, then, is required to “lay down the *primitive* forms of meaning” and to fix “the primitive forms of *compounding* and *modification* permitted by the essence of different categories of possible elements” (ibid., IV §13).

However, Husserl never developed a developed theory of universal grammar (presumably leaving this task to linguists). Additionally Husserl’s account is flawed in at least one respect: the meaning-categories ultimately governing possible transformations are the “objective counterparts of the grammatical categories that were regarded as standard in Husserl’s time” (Bar-Hillel: 1957, 365). These traditional ‘parts of speech’ were developed to explain Indo-European languages – often from philological concerns, though Arnauld and Lancelot use these same ‘parts of speech’ in the *Port-Royal Grammar* where they are interpreted, in Cartesian fashion, as expressing forms of meaning – and identified via the possible inflections for particular groups of words (see Rauh: 2010). These categories therefore encounter severe problems if they are used in an attempt to understand, say, Native American languages, and Bar-Hillel notes that Husserl’s account is thereby similarly Euro-centric (1957, 365). Nonetheless, in this section I suggest that some of these Husserlian concepts might be fruitfully employed to bring together topics discussed in the preceding sections. Importantly, although I am discussing Husserlian themes, I am *not* using the same grammatical forms or categories that Husserl assumes.

Both Husserl’s distinction between independent and non-independent meanings and his corresponding distinction between categorematic and syncategorematic meanings are arguably present in the ‘Un-Cartesian’ perspective on generative linguistics:

Just as we would not say that the foot is in some plain sense *contained* in the leg, or the leg in the body, but that the foot is a part of the leg and the leg a part of the body, we might say that a derivation creates integrated wholes, which, when the derivation continues, become parts of larger integrated wholes. Intuitively, when inserted into the derivation, *kill* is inherently deficient,

like a whole lacking one of its essential parts, such as a leg without a foot. As such, *kill* simply makes no sense, just as a leg doesn't that lacks a foot. (Hinzen: 2006, 189)

The point of difference between the Un-Cartesian and Husserlian positions is that the meanings of lexemes do not, strictly speaking, appear to encapsulate independent meanings. Absent the functional categories, it is doubtful that a lexeme, a single root word, makes much sense. Contra Husserl, every word we utter is grammatical in some way and in order for there to be a 'complete' meaning – or, in Husserl's terminology, a categorematic meaning – functional categories must be used thereby making lexemes capable of indicating objects or events (see Hinzen and Sheehan: forthcoming).

Additionally, Husserl's insight that meaning might be transformed about an essential kernel may be drawn upon to elaborate the account of time-determination here. In the previous two sections, I suggested that the lexemes may be schematised as objects via determiners and as events via aspect, but there is also the possibility of embedding one form of time-determination within another so that, say, an aspectualised lexeme is embedded within a determiner phrase. For example, 'the hammering' denotes the persistence through time of an event that is the iterated action of hammering. We may also talk about 'hearing the hammering' as referring to the event that is the auditory perception of the event that is the iterative action that is conceived as persisting through time.¹⁰⁹ In such cases there seem to be subtle modifications of meaning 'about an essential kernel': the kernel is grounded in equipment (the hammer) understood in terms of its affordances; the kernel is understood as iterated action (hammering) afforded by the equipment with the temporal form of repetition through time due to its aspectual modification; the iterated action is understood as an event persisting through time due to the determiner which allows us to treat it as an object.

To further flesh this point out, consider the following set of verbs which – I assume – are grounded in the same executing-schema: 'step'; 'walk'; 'run'. Although the semantics of 'walk' presumably differs from that of 'run' due to the different parameter values for speed, both of these verbs are inherently iterative and in this respect they are distinguished from 'step'. Saying that someone is running or walking denotes a *single* action consisting of an iterated execution of the movement whereas saying someone is stepping seems to conjure

¹⁰⁹ Interestingly, it does not seem possible to embed this unit any further, i.e. '*the hearing the hammering' is ungrammatical and does not yield a unified meaning. 'The hearing *of* the hammering' does yield a unified sense, but 'of the hammering' is a prepositional phrase not a determiner phrase. Given that I am restricting myself to certain grammatical categories I do not explore here why embedding is so constrained, though it seems to relate to the 'templatic' manner in which phases may embed within one another (Arsenijevic and Hinzen: 2010, 168): CPs contain vPs which contain DPs, but each phase may not embed itself directly. In this sense, X-within-X recursion is rare in language (see Arsenijevic and Hinzen: 2012).

up a *sequence* of actions each consisting of a complete execution of the movement. When we schematise these lexemes as objects it seems that the inherent aspect, being a part of the meaning's 'kernel', is preserved. 'A step' thus denotes a single execution of the movement, whereas a walk denotes a series of iterated executions.

Such examples allow another Husserlian theme to be seen – that language is required for full rationality and to provide a means by which thought is structured. For example, we can no doubt feel the force of a strong wind driving into us and understand that this same wind is responsible for the rattling doors, windows, etc. This understanding seems to be non-linguistic, instead being a part of our embodied being-in-the-world and it consequently seems reasonable to suppose that many other embodied creatures are capable of this same understanding. However the capacity to conceive of the wind as *blowing* on the windows and doors seems to require language in order to give the wind a sense of agency, to conceive of the windows and doors as patients, and to place the wind, windows, and doors as participants in the event of 'blowing'. The importance of schematisation can be seen by noting that a statement such as 'the wind is blowing on the door' requires 'blowing' to be in the progressive aspect in order to be understood as referring to the ongoing situation of the strong wind that is causing the doors and windows to shake and rattle.

This brings us to Glenberg and Robertson's 'indexical hypothesis'. This hypothesis asserts that sentence comprehension requires three processes (Glenberg and Robertson: 2000, 383; Kashak and Glenberg: 2000, 508): indexing words and phrases to referents; deriving affordances from the referents; meshing the affordances in a manner subject to biological, physical, and syntactic constraints. The biological and physical constraints on 'meshing' pertain to possible actions: "just as language is not a concatenation of words, meaning is not a concatenation of affordances. The affordances must be combined (or meshed) into a coherent pattern, that is, one that supports action" (Kashak and Glenberg: 2000, 525). By contrast, the syntactic constraint pertains to how lexical elements are positioned within the overall grammatical construction. Hence, Kashak and Glenberg theorise that linguistic meaning results from the interaction between affordances (a type of 'knowledge' about the world) and grammatical constructions (linguistic knowledge).

In order to investigate the influence of these constraints, Kashak and Glenberg investigated how people understand novel denominal verbs, i.e. novel verbs derived from nouns (e.g. 'to crutch'). Their first two experiments produced results supporting the notion that subjects were sensitive to the syntactic forms within which novel denominal verbs occurred and two factors implied that the subjects' intuitions were not simply the result of the

semantics of particular lexical items: first, novel denomials (such as 'to crutch') have no meaning outside the complete utterance ('she crutched the apple to him'); second, the meanings of novel denomials alters when they are within different grammatical structures (subjects judged that the denomial in constructions such as 'Lyn crutched Tom her apple so he wouldn't starve' implied transfer, whereas in 'Lyn crutched her apple so Tom wouldn't starve' it implied 'acted upon'). Hence, subjects "were sensitive to differences in constructional [i.e. grammatical] meanings even when differential cues to this meaning could not have come from the verbs and nouns in the sentences" (ibid., 524).

Kashak and Glenberg's other set of experiments investigated how the grammatical constraint interacts with the physical and biological constraints. Although they consider grammatical constructions constitutive of meaning, Kashak and Glenberg note that the affordances of the situation must support the scene provided by the grammar otherwise comprehension will suffer (ibid., 518). The experimenters therefore presented subjects with texts indicating a potential transfer of an object. One set of texts expressed situations where the transfer was easily afforded by the object, for example 'Rachael noticed an office chair with four *good* wheels'. The other set of texts expressed a situation where the transfer was not easily afforded by the object, but did not rule out the transfer completely, for example 'Rachael noticed an office chair with four *missing* wheels'. The difference was achieved by altering a property of the object used to effect the transfer, e.g. when the chair has four good wheels it affords the transference of the mail and therefore the sentence 'Rachael chaired the scientist his mail' is comprehended easily, whereas when the chair has four missing wheels transference is not obviously afforded and consequently comprehension suffers. Their experiments revealed that subjects found it far more difficult to comprehend the expressions denoting situations where there was no easy affordance of transfer on the part of the object. These results parallel those of Glenberg and Robertson (2000), who note that we are capable of consistently discriminating between those sentences which express actions afforded by an object – for example, 'After wading barefoot in the lake, Erik used his shirt to dry his feet' – and those which attempt to express actions which are not afforded by objects – for example, 'After wading in the lake, Erik used his glasses to dry his feet' (2000, 395). In the former example, the physical nature of the shirt facilitates the drying action and therefore the sentence is easily understood, whereas in the latter example the physical nature of prototypical glasses does not afford drying and comprehension suffers – though, to be sure, we could imagine that "Erik was clowning around" and that he was "wearing a large pair of

glasses carved out of a sponge, [and therefore] we can envision the mesh of glasses and drying” (Glenberg and Robertson: 2000, 384).

The account of schematisation given in this chapter makes possible an alternative interpretation of the indexical hypothesis, namely, that grammar is required in order to index words to their ‘referents’. Glenberg and Robertson (2000) only emphasise grammar in relation to the third step where affordances are meshed in a manner guided by the grammar, and Kashak and Glenberg (2000) maintain that the grammatical construction within which the novel denominal verb occurs constrains possible interpretations of the verb, and therefore that constructions aid children’s language acquisition and continue to be relevant for adults’ language processing (2000, 524).¹¹⁰ The first step, indexing words to objects and actions, is not explicitly linked to grammar by Glenberg and Robertson (2000) nor Kashak and Glenberg (2000). Nonetheless they write that “the noun phrase ‘the chair’ may be taken to refer to an actual chair in the perceiver’s environment or indexed to a prototypical representation of a chair that retains perceptual information” (Glenberg and Robertson: 2000, 383), which seems to indicate an acknowledgement that some type of grammatical operation occurs *prior* to indexing. It seems possible to go further, however, and argue that grammar makes possible the indexing of words to objects and events. As noted in the second section of this chapter, the grammar of phrases such as ‘the chair’ ensure that they are interpreted as expressing objects, whereas phrases lacking this object-schematisation may be interpreted as applying to the ‘things in general’, e.g. ‘chairs are comfortable’ is a statement about ‘chairs in general’ rather than any specific chairs which happen to be in the speaker’s environment. Hence, although we might accept a considerable part of the indexical hypothesis, it might be said that there is something *prior* to pragmatics – namely, grammar.

The account of schematisation and the insights of the indexical hypothesis also allow a response to the Cartesian separation between grammar and meaning. Recall (from chapter 1) that Chomsky argues grammar to be “autonomous and independent of meaning” (2002, 17). His famous examples being:

- (1) Colourless green ideas sleep furiously
- (2) *Furiously sleep ideas green colourless

¹¹⁰ Although they believe their result to support ‘construction grammar’, Kashak and Glenberg acknowledge their results are compatible with “alternative approaches to form-meaning links” (200, 525). In particular, they consider the criticism that their results might reflect subjects’ use of thematic roles in comprehending the sentences, e.g. that a novel denominal verb is to be interpreted as transferring an object to a person because they detected the recipient role. However, they point out this does not genuinely seem to be an alternative explanation: “constructions carry both syntactic information and information about the thematic roles linked to each syntactic category” (ibid.).

Any English-speaker will recognise that (2) is ungrammatical whereas (1) is not. However, claims Chomsky, both are “equally nonsensical” (ibid., 15). The indexical hypothesis, emphasising the embeddedness of the speaker in their environment, implies that Chomsky’s verdict on (1) might not be accurate – that is, (1) is not equally as nonsensical as (2) because whereas the grammar of (2) precludes the expression having any meaning whatsoever, (1) may become perfectly understandable given an appropriate situation. Consider the following entry from C. M. Street to a competition at Stanford where the contestants were challenged to make Chomsky’s famous sentence meaningful using no more than 100 words or 14 lines of verse:

It can only be the thought of verdure to come, which prompts us in the autumn to buy these dormant white lumps of vegetable matter covered by a brown papery skin, and lovingly to plant them and care for them. It is a marvel to me that under this cover they are labouring unseen at such a rate within to give us the sudden awesome beauty of spring flowering bulbs. While winter reigns the earth reposes but these colourless green ideas sleep furiously.

Street’s use of Chomsky’s sentence appears perfectly meaningful, whereas it does not, even in principle, seem to be possible to interpret ‘*furiously sleep ideas green colourless’ with unified sense precisely because its grammar precludes this. Granted, it might be possible to contrive a situation where the series of the words is given a meaningful function – e.g. a password for spies verifying each other’s identities – but this is a highly artificial case that seems to derive from, as opposed to explain, normal language use. In this highly artificial case, neither the grammar nor the lexical items combine to form the meaning – rather, the ‘sound-pattern’ is arbitrarily assigned (an operation which is no doubt conducted in normal language).

Both Street’s adaptation of Chomsky’s example and Glenberg and Robertson’s use of affordances might also be explained in Husserlian fashion. Husserl conceived of universal grammar as “the requirements of *merely significant unity*, i.e. the *a priori* patterns in which meaning belonging to different semantic categories can be united to form one meaning, instead of producing chaotic nonsense” (Husserl: 2001b, IV). Grammar, guarding against nonsense, is thus prior to logic in the sense that expressions such as ‘a square circle’ must be well formed *before* they can be judged as logical absurdities. Relating this idea to the indexical hypothesis, grammar – in serving to index the lexemes to their referents or making them understood as actions – creates structures which may be completely meaningful in virtue of the lexical items’ prototypical affordances meshed in accordance with the grammatical structure. However, where the lexemes’ prototypical affordances do not naturally mesh, such as in the case of colourless green ideas sleeping furiously, the sentence might only be ‘fully’

meaningful in virtue of context, either environmental context, such as a specific pair of glasses being made of sponge, or linguistic context, such as that provided by Street's passage. In Husserlian terminology, certain expressions might be grammatically well formed but lack 'fulfilment', and it is the environmental structures which provide fulfilment in non-prototypical cases – if the extended mind hypothesis is correct, then it might be that the environmental structures *are* the fulfilment.

In summary, I have suggested that: determiner phrases make lexemes understood as objects via the schema of persistence through time; aspectualising a lexeme makes it understood as an event by schematising it with the temporal forms of our embodied action; grammar allows us to schematise a lexeme with a meaning grounded in an experience of an object as an event via aspectualising it, and a lexeme grounded in a motor process as an object by embedding it within a determiner phrase – in both cases preserving an essential kernel of meaning. This implies that although a considerable portion of meaning might come from pragmatics, this is made possible by grammar.

7. Notes on Truth

In the *Prose of the World*, Merleau-Ponty, in a reference to his incomplete project, writes: “It would obviously be in order to give a precise description of the passage of perceptual faith into explicit truth as we encounter it on the level of language, concept, and the cultural world” (Merleau-Ponty: 1964a, 94). A parallel problem arguably occurs in embodied cognition, many of whose theories are inspired by case studies of infant walking, spatial navigation, object manipulation, etc. As Clark notes, the ‘pressing’ question is “how to relate the insights gained from recent work in robotics, artificial life, and the study of situated cognition to the kinds of capacity and activity associated with so-called higher cognition?” (Clark: 2001, 140)

Judgements of truth seem to be paragons of higher cognition, and it is a considerable challenge to proponents of embodied cognition to provide an account of how judgements of truth are possible. In this chapter I briefly review Heidegger’s writings on truth, drawing attention to areas of common ground with research from embodied cognition (specifically Lakoff and Johnson, Barsalou, and Glenberg). I then move on to Hinzen’s account, based on generative linguistics, which accounts for our judgements of truth in terms of assertions’ grammatical structure, and I give the transcendental argument that we might accept much of the ‘Heideggerian’ accounts of truth but *what makes such accounts possible* is the underlying grammar. I then draw upon work in the previous chapter where I argued that expressions may be brought into coincidence with the world via schematisation. Arguably then, this chapter follows Heidegger’s claim in *Being and Time* that a full explication of the “temporal characteristics of language-patterns” requires that the relation between “being and truth” is cast in terms of temporality (Heidegger: 2006, H349). Expressions may be brought into coincidence with the world by being translated into appropriate temporal form and, as will be discussed in a section on tense, mapped to a temporal location. Although I suggest that appreciating the significance of grammar may provide the grounding for a theory of truth which is based on insights from embodied cognition, the work in this chapter nonetheless only scratches the surface and falls short of providing a theory of truth proper (other categories necessary for a full account of truth, e.g. assertoric force, are not addressed).

Common to both the ‘Heideggerian’ and generative approaches to the concept of truth is the observation that the relation of correspondence (the conformity or ‘fit’ of our ideas or representations to reality) is what is to be explained, not the explanation itself. Heidegger seeks to ground this relation of correspondence in a more primordial ‘ontic truth’ of the manifestness of beings, which is ultimately made possible by being-in-the-world. Various researchers from the embodied cognition tradition have, similarly, argued that ‘truth’

originates in ‘mappings’ (Barsalou) or ‘indexings’ (Glenberg) of words to our percepts and, though them, to reality. However, because these thinkers maintain that our categories originate in our interaction with the world, the categories we use to construct judgements of truth will inevitably highlight some features of the world at the expense of others. Consequently, both Heidegger and Lakoff and Johnson emphasise that this theory implies a mild relativist account of truth. These ‘Heideggerian’ approaches will be outlined in the first section.

The second section introduces the account of the grammatical structure of truth judgements given by Hinzen (2007) and Hinzen and Sheehan (forthcoming). Whilst they agree that the ‘correspondence’ relation is what is to be explained, they diverge from the Heideggerian accounts by engaging in a grammatical analysis in order to make explicit the structure of judgements of truth. In so doing they identify that linguistic structures may only be evaluated for truth when they are *matrix* clauses, i.e. *embedded* clauses are not evaluated for truth, only the ‘highest’ structure is. This seems to indicate an irreducible grammatical component to the ‘origin of truth’.

The third section discusses tense, suggesting that if the previous chapter is correct that reference is possible because grammar might schematise lexemes into temporal forms ‘homogenous’ with the events they indicate, then we still require the category of tense to establish when the perceived object is relative to the speaker and possibly an additional ‘point of reference’ about which the speaker indicates the event. If theories of truth from embodied cognition are correct to claim that truth concerns our indexing or mapping words to situations then tense makes possible indexing to situations which are not immediately given in experience.

7.1 Correspondence

A relation of correspondence between assertion and reality is at the heart of traditional accounts of truth – such accounts, says Heidegger, consider that the “locus” of truth is the assertion or judgement and that “the essence of truth lies in the ‘agreement’ of the judgement with its object” (Heidegger: 2006, H214). This correspondence relation is acknowledged by Heidegger and some proponents of embodied cognition, such as Lakoff and Johnson, as capturing an important part of truth. Heidegger writes that when we consider “the old, traditional definition of truth from this perspective – the definition *veritas est adaequatio intellectus ad rem*... [i.e.] conformity, assimilation of thinking to the thing that is thought – then we can see that this old definition of truth is indeed correct in its approach” (Heidegger: 1995, 342). Similarly, Lakoff and Johnson, from the perspective of cognitive

linguistics and embodied cognition, consider the “folk theory” based on correspondence between sentence and world as “fundamentally right” (Lakoff and Johnson: 1999, 120).

These remarks should not, however, be taken to imply support for the traditional correspondence theory. Despite correspondence being the point of departure for Heidegger’s analysis (Heidegger: 2006, H214; see also Wrathall: 2006, 243), and despite it being “thought to need no further special proof” that the correctness of a statement consists in correspondence between assertion and reality (Heidegger: 2009, 139), that this “customary determination” is “obvious” when we “reflect no further on it... is not yet a sufficient foundation for the delimitation of the essence of the true” (Heidegger: 1994, 37). Whilst Heidegger believes the traditional definition is “correct in its approach” he makes clear that it is “merely an approach to the problem of asking what grounds in general the possibility of conforming to something” (Heidegger: 1995, 342).

Correspondence, then, is what is to be explained, *not* the explanation itself. Hence, Heidegger believes the traditional account is not primordial but derivative, and criticises the traditional conception of truth on the basis that it is not sufficiently grounded – that is, that it remains ‘ontologically unclarified’ (Heidegger: 1994, 36; see also Wrathall: 2006, 243 and Blattner: 2006a, 120). Lakoff and Johnson also make the point that correspondence – the ‘fit’ between assertion and world – is what is in need of explanation:

What does ‘fit’ mean when there is a mind-world chasm and a need to say what the correspondence between symbols and the world consists in. It is not enough to say, ‘Poof! Let there be correspondence.’ The correspondence is left up to the theory of reference, a theory that is supposed to bridge the symbol-world gap. But theories of reference have been of little help for what we will see is a deep reason. (Lakoff and Johnson: 1999, 98)

The “deep reason” that Lakoff and Johnson refer to is an implication of their underlying theory of concepts, or ‘categories’, and is explained in more detail below. But, briefly, Lakoff and Johnson’s theory of concepts is as follows: interpreting a sentence as true requires understanding that sentence (Lakoff and Johnson: 2003, 166); understanding a sentence requires categories; categories identify kinds of objects or experiences by “highlighting certain properties, downplaying others, and hiding still others” (ibid., 163). Lakoff and Johnson therefore attempt to explain the nature of the correspondence relation in terms of our underlying conceptual system(s).

Similarly, Heidegger’s phenomenological approach aims to make “visible” the “primordial phenomenon of truth” which underlies the correspondence relation and makes it possible (Heidegger: 2006, H214). This phenomenology is *not* intended to be a new theory,

but rather to support the basic intuition of the traditional theory which Heidegger regards as “uncircumventable” (Heidegger: 2009, 103; Blattner: 2006a, 121). Hence, when Heidegger takes his “departure” from the traditional account of truth he is attempting to “lay bare the ontological foundations of that conception” (Heidegger: 2006, H214) – he is relying on the “customary conception” of truth because he is “seeking a foundation for this reliance” (Heidegger: 1994, 36). Heidegger’s phenomenology therefore aims to ground the correspondence relation and he maintains that until it is so grounded “all dispute over the possibility and impossibility, over the nature and degree, of correspondence loses its way in a void” (Heidegger: 2009, 141). What is “more originary” than correspondence of assertion with reality is the “pre-predicative manifestness of *beings*, which may be called *ontic truth*” (ibid., 103). Derivative, “propositional truth” must be able “to take up residence in a making-manifest that is *not predicative* in character” (ibid., 103). This basic ‘making-manifest’ of beings is the ‘unconcealment’ of entities (Blattner: 2006a, 119; Wrathall: 2006, 241). Just as cognition, propositions, judgements, and assertions are derived from and made possible by being-in-the-world, so too, Heidegger maintains, are the truth and falsity of assertions derived from a more fundamental ‘primordial truth’ (Blattner: 2006a, 118). This primordial truth “constitutes the ground for the possibility of correctness [of an assertion]” (Heidegger: 1994, 36) and Heidegger aims to show how the traditional conception of truth is derived from this ground (Heidegger: 2006, H214).

Common to both Heidegger and Lakoff and Johnson is the view that correspondence is derived from something more basic: in the case of Heidegger this is unconcealment; in the case of Lakoff and Johnson this is the nature of our conceptual system. This section will examine three areas of similarity between, on the one hand, Heidegger’s account of truth and, on the other, Lakoff and Johnson’s, linking them with other work in cognitive science (specifically, Barsalou’s work on symbol grounding and Glenberg’s indexical hypothesis): first, Heidegger’s account of ‘unconcealment’ and Lakoff and Johnson’s account of how categories structure experience; second, that ‘truth-bearing’ assertions are derivative from unconcealment and/or conceptual structure; third, in Heidegger’s jargon, that truth is ‘relative to Dasein’, and, in Lakoff and Johnson’s, that an ‘objectivist’ account of ‘absolute’ truth is impossible – though, in both cases, this is *not* to say truth is subjective (Heidegger: 2006, H227).

Heidegger claims that assertions do not *represent* entities, but *present* them – they are “a way of being orientated within the world so that a state of affairs can show up” (Wrathall: 2006, 244). To see what Heidegger might mean, consider his example of a man with

his back to a wall asserting that ‘the picture on the wall is hanging askew’. Given that the man, when he uttered his assertion, cannot perceive the picture, then to what, asks Heidegger, is the man’s judgement related? Not to “representations” (considered as a “psychical process”) but rather, according to Heidegger, to the real picture on the wall: “What one has in mind is the Real picture, and nothing else” (Heidegger: 2006, H217). An assertion regarding an entity therefore demonstrates “*that entity* in the ‘how’ of its uncoveredness” (ibid., H218) and an assertion is ‘true’ if “what it means and says is in accordance with the matter about which the statement is made” (Heidegger: 2009, 138). If the man tells us that the picture is hanging askew, and we look and see that it is indeed hanging askew, then what we experience is not a relation of correspondence between the man’s words and the picture, but rather we experience the picture itself just as the man described it (Blattner: 2006a, 122).

Assertion, then, is “a way of being towards the thing itself that is” – an assertion “points out, ‘lets’ the entity ‘be seen’ in its uncoveredness” (Heidegger: 2006, H218). Knowing “remains related solely to the entity itself” and in this entity “the confirmation... gets enacted... Representations do not get compared, either among themselves or in *relation* to the real thing” (ibid., H218). When the entity shows itself “in its selfsameness”, i.e. in the same manner given in the assertion, then Heidegger states that the “uncoveredness is confirmed”: “‘Confirmation’ signifies *the entity’s showing itself in its selfsameness*” and this “is accomplished on the basis of the entity’s showing itself” (ibid., H218). This uncoveredness, or *unconcealment*, “guides all comportment toward beings” (Heidegger: 2002, 35).

Hence, when Heidegger refers to the traditional definition of truth, “*veritas est adaequatio rei et intellectus*” (Heidegger: 2009, 138), he notes that in “the *adaequatio* something gets related” and asks “what is that with regard to which it agrees? ...With regard to what do *intellectus* and *res* agree?” (Heidegger: 2006, H216) Heidegger makes clear that propositions are true insofar as they are in accordance with the world (Heidegger: 2009, 138), or by “conforming to the unconcealed” (Heidegger: 2002, 28), and consequently claims that “for knowledge, and for the sentence that forms and expresses it, to correspond to the facts it is necessary... that the fact which is to be binding on the sentence show itself to be such” (ibid., 28). A phenomenological understanding of the foundation of correspondence thereby reveals itself as the fact showing itself to be as the statement indicates – as Heidegger summarises: “*adaequatio* refers to this commensuration in the sense of bringing-into-coincidence” (Heidegger: 1992a, 51). According to Heidegger, the traditional theory, in overlooking the unconcealment of entities, assumed ‘propositions’ to be both basic and ‘ideal’ entities (or *representations*) and therefore considered truth to be the correspondence

between representation and reality. Hence, Heidegger's criticism of the traditional correspondence theory is that it imposes a Cartesian subject-object model on truth (Blattner: 2006a, 119).

Parallel to how Heidegger attempts to avoid the language of subject and object, Lakoff and Johnson emphasise that because assertions conveying truths will ultimately be based on the way we categorise objects and experiences, such statements do not typically indicate properties of objects themselves but rather highlight "*interactional properties* that make sense only relative to human functioning" (Lakoff and Johnson: 2003, 163). Consider, for example, colour – Lakoff and Johnson (1999, 23) emphasise that experience of colour is generated by multiple factors: wavelengths of light received by retinas and the environment's lighting conditions; three kinds of colour cones in the retinas which absorb the light; the neural circuitry connected to those cones. Together these factors produce, via their interaction, the "qualitative experience... [that] we call 'colour'" (ibid., 24). Hence, colour does not reside 'exclusively' in the subject or the object, and our colour concepts are thereby grounded in the interaction of brain, body, and world. Our understanding of objects is accounted for in similar fashion – the structure of our brains and bodies, interacting with each other and the object, makes possible our understanding and experience of an object such as a chair, whose shape affords the action of sitting given the structure of our bodies. Lakoff and Johnson (2003) hypothesise that all our concepts are ultimately traceable to embodied experience, either directly or via (chains of) other concepts. Those concepts which are *directly* grounded in embodied experience come in two types: 'basic level' concepts and 'image schematic concepts'.

Basic level concepts are basic in four respects (Lakoff: 1987, 47): perceptually; functionally; communicatively; organisationally. Perceptually, members of a basic-level category tend to have similar overall shapes and they are the highest level where single mental image may represent the entire class (e.g. we can form a mental image of a chair – 'chair' being a basic level category – but not the superordinate category of 'furniture'). Functionally, members of a category are used to accomplish the same goals. Communicatively, members tend to be the first lexical items in language acquisition (e.g. children acquire 'dog' prior to both 'mammal', a superordinate category, and 'spaniel', a subordinate category). Organisationally, knowledge of the properties of category members appears to be stored at the basic level. A proposition such as 'snow is white' employs basic-level categories because 'snow' and 'white' can be grounded directly in experience. By contrast, image-schematic concepts include trajectories and containers – such image-schematic concepts may be

grounded in experience, e.g. a ball being thrown on a trajectory or a toy car being put in a box, despite not being of any particular object.

Lakoff and Johnson believe the traditional theory is right to emphasise correspondence for the subset of sentences based on such basic-level and image schematic concepts (1999, 120). Just as Heidegger argues that the correspondence relation is made possible by the ‘unconcealment’ given by the fact showing itself, Lakoff and Johnson argue that the embodied, interactive nature of our most basic concepts allows the symbol-world gap to be bridged – due to their grounding in embodied experience, these basic level and image schematic concepts *directly* ‘fit’ its preconceptual structure (Lakoff: 1987, 297).

Barsalou (1999b) seems to explore precisely this ‘fit’ between basic-level and/or image-schematic concepts and the world in his account of how perceptual symbol systems (as opposed to amodal symbol systems) may represent abstract concepts. He offers an account of truth in terms of the mapping from our understanding to a perceived situation, and makes clear that only “a core sense of people’s intuitive concept of *truth* is addressed” and that analysis “does not attempt to account for all senses of truth, nor for its formal senses” (1999b, 601). Specifically, Barsalou suggests three mechanisms to allow a perceptual symbol system to simulate abstract concepts – including truth. The three mechanisms are ‘framing’, ‘selectivity’, and ‘introspective symbols’, with concepts such as ‘truth’ thereby arising via these mechanisms (ibid.). First, a proposition is ‘simulated’, e.g. on hearing ‘there is a balloon above a cloud outside’ the agent forms a mental simulation of this event. Second, the agent attempts to map the simulation to the perceived world, e.g. the visual information that there is a balloon above a cloud, or perhaps to a memory of a situation perceived earlier (or perhaps to another source of evidence). Third, the agent assesses whether the simulation accurately depicts the situation; if it does, the agent considers the proposition true. Truth is thereby *framed* via the simulated event sequence. However, the ‘truth’ is not the whole simulation but a part of it (*selectivity*), namely the outcome that the simulation may be accurately mapped to the situation. Hence, *introspective symbols* are central to Barsalou’s account as the agent represents to themselves that the mapping has been successful. Ultimately, then, Barsalou claims that ‘truth’ is a simulator which develops from repeated mappings from the simulation to the world: “people learn to simulate the experience of successfully mapping an internal simulation into a perceived scene” (ibid.). Conversely, ‘falsity’ may also originate in experiences where mappings from simulation to situation fail (ibid.).

Glenberg notes Barsalou’s account is “almost identical” to the ‘indexical hypothesis’ that words are indexed to objects, affordances derived from those objects, and then those

affordances meshed to produce understanding (Glenberg: 1999, 618; see also previous chapter). In both Barsalou and Glenberg's accounts, the relation of 'correspondence' is present: in Barsalou's, the agent must determine whether their simulation corresponds with perceived reality; in Glenberg's, comprehension ultimately relies on accurate indexing. In both also, truth emerges from something more primitive – namely, perceptual symbols (Barsalou) and affordances (Glenberg). In this way, they also seem to resemble Lakoff and Johnson, who ground truth in basic-level and image-schematic concepts, and Heidegger, who grounds truth in 'unconcealment'. Within this tradition, truth is therefore considered *derivative* of these more primordial structures.

In this regard, Heidegger maintains that "being-true" or "being-uncovering" is "ontologically possible only on the basis of being-in-the-world", that is, being-in-the-world is the foundation for primordial truth and hence correspondence (Heidegger: 2006, H219). Although assertion has been "accepted from ancient times as the primary and authentic 'locus' of *truth*" (Heidegger: 2006, H214), in claiming assertion to be derivative Heidegger calls into question the traditional theory's assumption that propositional truth is the 'core' or 'paradigmatic' instance of truth (Wrathall: 2006, 241). Instead, Heidegger contends, we should realise that assertions simply cannot be made absent broader forms of communication and, crucially, these "broader forms of communication disclose the world... at a more basic level than do assertions" (Blattner: 2006a, 125). As Heidegger puts it: "Assertion is not a free-floating kind of behaviour which, in its own right, might be capable of disclosing entities in general in a primary way: on the contrary it always maintains itself on the basis of being-in-the-world" (Heidegger: 2006, H156).

Although our understanding of an object might seem "vague" when compared to the explicitness provided by an assertion, Heidegger emphasises that this "does not justify our denying that there is any Articulative interpretation in mere seeing, and hence that there is any as-structure in it" (ibid., H149). Heidegger's point is that the understanding of entities *as* what they are (i.e. understanding a particular entity as a hammer) is part of a larger "totality of involvements" in terms of which objects are understood, and this totality, precisely because it is that in terms of which we understand entities, "hides" within it what is brought out and made explicit in assertion (ibid., H149). Taking Heidegger's example, if we find that a hammer is too heavy for a particular task then we tend to set the unsuitable tool aside or exchange it "without wasting words... From the fact that words are absent, it may not be concluded that interpretation is absent" (ibid., H157).

Interestingly, Lakoff and Johnson, agreeing with Heidegger that the correspondence relation and the concept of truth are grounded in something more primordial, also point to instances of truth whose sentences are conceptually structured with *indirect* concepts, e.g. abstract, metaphoric, metonymic, etc., which by their very nature do not exhibit any ‘isomorphism’ with experience (Lakoff: 1987, 297). The question is therefore how we can understand sentences as being true when they are not conceptually structured with basic-level or image-schematic concepts. Lakoff approaches this by suggesting that we analyse the concept of truth as we would any other human concept (ibid., 296). In line with his theory of concepts, Lakoff proposes truth to be a *radial* category: “A radial structure is one where there is a central case and conventionalised variations on it which cannot be predicted by generalised rules” (ibid., 84). However, this does not imply that a radial category contains *random* variations on the central case – rather, the central case *constrains* and determines the possibilities for extensions (ibid., 91). Truth would thus be structured as a central subcategory with extensions non-randomly linked to but not strictly predictable from this central subcategory. Truth’s central subcategory is composed of those truths which are characterised in terms of, first, basic-level concepts and, second, kinaesthetic image-schematic concepts (ibid., 296) – i.e. those grounded *directly* in experience. Hence, extension of truth’s central subcategory is possible because our understanding of a statement can be made to fit, e.g. via metaphor, our understanding of the situation (Lakoff and Johnson: 2003, 180). In such non-central subcategories the “issue of truth” is “whether the coherence provided by the narrative matches the coherence you see in your life” (ibid., 172). Hence not only is the correspondence relation grounded in something more primordial, but there are other instances of truth not easily captured by ‘correspondence’ – Lakoff therefore characterises truth as a “bootstrapping operation” where conventional variations are progressively built upon the central case (Lakoff: 1987, 297).

The accounts of truth given here also imply a degree of ‘relativism’. Heidegger’s definition of ‘assertion’ is “a pointing-out which gives something a definite character and which communicates” (Heidegger: 2006, H156). There are three parts to this definition. First, the “primary signification” of assertion is ‘pointing out’ – assertions indicate real entities; they do not simply represent them (ibid., H154). Second, assertions give the indicated object “*a definite character*” via predication – which presupposes the first part, that the entity itself has been pointed out (ibid.). Crucially, this predication is a *restriction* of how we see the entity:

It is not by giving something a definite character that we first discover that which shows itself – the hammer – as such; but when we give it such a

character, our seeing gets *restricted* to it in the first instance, so that by this explicit *restriction* of our view, that which is already manifest may be made *explicitly* manifest in its definite character. (ibid., H155)

To illustrate this, take Heidegger's example of uttering a sentence such as 'this hammer is too heavy'. The predicate 'too heavy' serves to restrict our 'view' of the object to a particular property, namely being unsuitable because of its excessive weight. However, in focusing on a single property, the assertion narrows our view of the object to the character we make explicit, but this entails that other characteristics of the object recede into the background.

The third part of Heidegger's definition, communication, is made possible by the first and second parts. Assertions are communicative in that they let "someone see with us what we have pointed out by way of giving it a definite character" (Heidegger: 2006, H155). In consequence, Heidegger advances a view of language where beings are brought "into the open" and determines "what beings will come into the open as" (Heidegger: 2002, 46). Returning to the differences in verb meanings given in chapter 5, certain verbs will highlight different characteristics of muscle movements (the English words 'push' and 'pull' may therefore not find exact equivalents in other languages): "Language, by naming beings for the first time, first brings beings to word and to appearance" (ibid.). Hence, if different languages highlight different features of the world, then a degree of relativism is implied as an assertion in any given language will use words from that language which inevitably brings into the open certain features of their world at the expense of others.

However, although Heidegger states "*all truth is relative to Dasein's being*" he qualifies that this "relativity" does *not* imply that all truth is "left to the subject's discretion" (Heidegger: 2006, H227). Unconcealment "takes asserting out of the province of 'subjective' discretion, and brings the uncovering Dasein face to face with the entities themselves" (ibid.). Heidegger's point is that if truth is an aspect of our assertions, and primordial truth is a part of our more fundamental disclosure of the world, then "the bearers of truth are aspects of our being and activity" (Blattner: 2009a, 126).

Once again, perhaps Heidegger's point can be illuminated by drawing a parallel with Lakoff and Johnson. Lakoff and Johnson consider the traditional 'folk' theory 'fundamentally right' in the case of utterances concerning basic-level concepts because in everyday experience we perceive the indicated properties as being 'in' the objects – in judging that the proposition 'snow is white' is true we take 'whiteness' to be a property of snow, which seems reasonable given that in experience (most!) snow is white and in visual perception the colour of a thing is intimately, inextricably bound to the object – at the level of experience, colour is

“a one-place predicate characterising a property that inheres in an object” (Lakoff and Johnson: 1999, 105). However, given the experience of colour is generated from the interaction of light wavelengths, and the structure of both our eyes and neural visual circuitry, at the level of these factors colour is a “multiplace interactional property” (ibid., 105). The point, then, is that a proposition might correspond to what is perceived on the noetic level but does not correspond to anything on the neural level; a proposition might therefore be true at one level of explanation and false at the other.

Such cases, argue Lakoff and Johnson (1999, 107), illustrate that people use the word ‘true’ *relative* to their understanding. The folk theory could therefore be considered ‘fundamentally right’ in the case of basic-level concepts because the shared structure of our embodiment gives rise to the same concepts which make possible understanding. But problems begin to occur when the folk theory departs from basic-level concepts, even when the propositions remain on the level of experience (as opposed to the functional/computational or neural levels). ‘Social truths’, such as who is or is not the world heavyweight boxing champion seem to have no obvious ‘objective correlate’: “who the World Heavyweight Champion is depends on which of the two major boxing associations you think has the right to award the championship” (ibid., 107). Equally, assertions to the effect that something is or is not ‘just’ will presuppose a certain understanding of justice.

Importantly, when the notion of ‘correspondence’ may be considered ‘fundamentally right’, it is relative to the understanding made possible by basic level concepts and therefore dependent on our embodied being-in-the-world. There is thus a fundamental disagreement between Lakoff and Johnson’s ‘embodied’ conception of truth, and the ‘traditional’ correspondence theories. Traditional theories tend to assume a classical view where concepts are delineated in terms of necessary and sufficient conditions. By contrast, Lakoff and Johnson, following Rosch, are sympathetic to a prototype theory – and, maintains Lakoff, irrespective of whether the world itself is structured in terms classical categories (i.e. objects with definite properties and relations), human cognition and semantics do not appear to be so structured: “The reason is that there are a great many categories of mind and language that are not reflections of alleged categories of the world” (Lakoff: 1987, 197). Hence, Lakoff and Johnson’s understanding of truth is *not* that of propositions corresponding with objective, mind-independent ‘states-of-affairs’ (Lakoff and Johnson: 1999, 120). Rather, they are concerned with the way that concepts are understood within a given context (Lakoff and Johnson: 2003, 164), holding that sentences are never understood on their own terms and require the “evocation of some larger gestalt that specifies the normal range of natural

dimensions (e.g. purpose, stages, etc.). Whichever gestalt is evoked, we understand much more than is given directly in the sentence" (ibid., 168).

Consequently, Lakoff and Johnson deny "there is such a thing as *objective* (absolutely and unconditional) *truth*" though they believe there to be *truths*, and claim "the idea of truth need not be tied to the objectivist view" that motivates the technical notion of correspondence (Lakoff and Johnson: 2003, 159). This view appears to have been shared by Merleau-Ponty, who wrote that it is natural to "believe ourselves in the presence of a world and a time over which our thought soars, capable of considering each part at will without modifying the part's objective nature" (Merleau-Ponty: 1964a, 93). Failure to recognise that truths are ultimately grounded in experience, says Merleau-Ponty, places us in a dilemma: either we hold onto the wider gestalt of practical possibilities against which a given sentence is understood, in which case these are "devalued by the ideal of absolute knowledge", or we "disguise" these possibilities as certainties, in which case "I am letting go of the verifiable for the sake of truth, which is to say I drop the prey to catch its shadow" (ibid., 95). In other words, we either consider that our concepts' grounding in embodied experience is a weakness when compared to an ideal standard of pure objective knowledge, or we disguise such concepts as objective and certain. In highlighting that propositional truth is derivative of more primordial truth, which in turn has being-in-the-world as its ground, Heidegger is claiming that "the bearers of truth are aspects of our being and activity" (Blattner: 2009a, 126). Nonetheless, if words are cultural 'tools' that selectively highlight and even structure aspects of experience, then there exists a degree of relativism: "There are no timeless propositions, we have seen, which could carry truth independently of the languages we use and worlds we disclose, and this means there is nothing that could be a timeless and eternal truth" (ibid.).

However, if the objectivist theory is false then this implies neither that truth is completely subjective nor that there are no such things as truths. Because our understanding of the world is primordially interactive, neither the objectivist nor the subjectivist positions are adequate – the latter in particular fails to acknowledge that understanding is ultimately grounded, hence constrained by, successful functioning in our physical and cultural environment (Lakoff and Johnson: 2003, 194). For subjectivism to be true, experience would have to have *no* natural structure and therefore impose no constraints upon meaning – but if our conceptual system is ultimately grounded in our interaction with the world, or, in Heidegger's terminology, in our being-in-the-world, then our reasoning is not simply arbitrary. Hence Heidegger's qualification that truth is not left to our own discretion (Heidegger: 2006, H227).

7.2 Grammar

‘Correspondence’ has also been identified as what is to be explained, as opposed to the explanation itself, by Hinzen, who approaches this problem from the perspective of generative linguistics and notes that the correspondence relation is not sufficient to explain truth. Hinzen (2007) and Hinzen and Sheehan (forthcoming) point out that ‘common-sense’ explanations of truth tend to be circular, presupposing the very thing they are intended to explain:

For millennia, philosophers and metaphysicians... ventured... that the world has to be a certain way, namely so as the proposition says as it is: what the proposition *says* is the case, also *has* to be the case; the proposition has to *mirror* or *correspond* to reality. This all sounds innocuous enough, if only we knew how to tell what ‘being the case’, ‘mirroring’, or ‘corresponding’ means, without circularly using the notion of truth to elucidate these notions. (Hinzen and Sheehan: forthcoming, 305; see also Hinzen: 2007, 10)

The correspondence theory, then, attempts to explain our understanding of truth in terms of the relation of ‘correspondence’, which in turn seems to presuppose an understanding of truth to make intelligible precisely this relation of correspondence: “if we are asked *what* relation correspondence is, and what thing it is that a true proposition corresponds to, the answer is that it is a thing that stands in such a relation to the proposition in question that it makes that proposition *true*” (Hinzen: 2007, 11). In this respect, Hinzen is also close to Heidegger and the other authors described in the previous section, who also emphasised that “where an effort is made – with a conspicuous lack of success – to explain how correctness is to occur, it is already presupposed as the essence of truth” (Heidegger: 2009, 139). Whereas Heidegger attempted to ground correspondence in a more primordial truth, Hinzen engages in a grammatical analysis to account for our capacity to judge propositions as true or false.

If grammatical, then truth is “*inherently structural*” (Hinzen: 2007, 39) – and truth comes *after* a great amount of structure has been built up. Evaluating a structure for truth is a “point of no return” as only matrix propositions seem open to truth-evaluation. Embedded clauses, by contrast, are not so open. Hence, “a proposition that is evaluable for truth, such as *she bought apples*, can only embed if it is *not* evaluated for truth: it is a condition for understanding *Milly said she bought apples* that the embedded proposition is *not* evaluated for truth, but only the matrix clause is” (ibid., 165). To emphasise this point, consider:

[John left]

Bill said [John left]

When the former occurs by itself we understand it as asserting something as true, i.e. that John left. However, when, as in the latter example, it occurs embedded within another phrase – when it occurs as an argument of ‘said’ – then it is not evaluated for truth by the speaker or hearer. Rather, in the latter example we may evaluate whether it is true that *Bill said* that John left; whether or not John actually left is irrelevant to the truth of that utterance as it is only the matrix clause that may effect “a truth-attribution” (Hinzen and Sheehan: forthcoming, 307). This also holds when the lexeme ‘true’ is used in a sentence:

It’s true that [John left]

This would make an odd response to the question ‘Has John left?’ or ‘Where’s John?’ because the utterance does not assert the ‘content’ of its embedded clause as true, i.e. that John left, but rather it asserts that *it is true that* John left. What is revealed by this example is that embedding does not change the embedded proposition’s ‘content’ but *does* alter “the intentional structure of a statement” (Hinzen: 2007, 5). This would imply that the lexeme ‘true’ is not necessary to attribute truth – and, additionally, neither does the lexeme appear to be sufficient (Hinzen and Sheehan: forthcoming, 308):

Bill considers it true that John left

This example shows an instance where the lexeme is used within an embedded clause, but precisely because it is so embedded the clause is not interpreted as attributing truth – rather what I understood to be true is that *Bill considers* it to be the case that John has left. For these reasons assertions of truth are deemed structural; hence intrinsically linked to grammatical relations (Hinzen: 2007, 6).

This focus on linguistic structure appears to be overlooked by the ‘Heideggerian’ accounts of the origin of truth discussed in the previous section in favour of ‘mappings’ which occur from words to perceptual symbols. It might, for example, be true that prototype effects result in instances where the truth of an utterance is not immediately apparent, however, this *presupposes* that we are able to evaluate the assertion for truth in the first place. For example, it seems intuitively and immediately obvious that the statement ‘robins are birds’ is true because a robin is a prototypical member of the category ‘bird’, but statements are less obviously true when non-prototypical category members are involved, e.g. ‘ostriches are birds’ or ‘penguins are birds’. Equally, the ‘deep reason’ that Lakoff and Johnson identify for the inadequacies of most traditional theories of reference – that our concepts are ultimately based on interactional properties; that concepts will highlight some properties whilst causing

others to recede into the background – is based on a theory of categories which might be accepted, whilst still emphasising grammatical structures which makes possible truth-evaluation. Although we might debate whether a statement *is* true, that we *can* take it to be true and that we only evaluate the matrix clause for truth appears to result from grammatical structure. Hence, the grammatical analysis implies that whilst we might accept the insights of the work from embodied cognition based on mappings from words to objects, these theories are not sufficient for an adequate account of truth. If we assume that the meaning of the lexeme ‘true’ is grounded in accurate mappings of ideas to reality, then it is nonetheless the case that this grounding does not *explain* but presupposes our capacity for judgements of truth.

Statements such as ‘Bill considers it true that John left’ reveal that the lexeme does not somehow make possible the judgement of truth – rather, in this example it is an argument of ‘considers’ and so it is *a part of* what is to be judged as true or false. Equally, statements *without* the lexeme ‘truth’ may still give truths, e.g. ‘Bill considers that John left’ or ‘John left’. In itself, this is not a serious problem for those theories from embodied cognition that claim truth concerns the mapping or indexing of words to perceived objects – the lexeme’s meaning might be grounded in successful mappings, but the lexeme itself does not need to be present for those mappings to occur and is therefore not necessary to account for the “tendency toward truth, of being true to itself, in the very sense of the assertion” (Heidegger: 1992a, 57).

Consequently, whilst Merleau-Ponty’s project of the origin of truth might require understanding the grounding of our concept of truth, it also seems to be the case that we must take grammatical structure seriously if we are to understand why “speech implants the idea of truth in us as the presumptive limit of its effort” (Merleau-Ponty: 2006, 221). Focusing on mappings between symbol and percept encounters a significant problem (at least, without further development) when faced with the observation that it is only matrix clauses that are evaluated for truth. If we understand statements via mapping or indexing, then presumably this applies to both embedded and matrix clauses. Presumably, then, accounts of truth in terms of successful mappings would predict that embedded clauses would also be evaluated for truth precisely because understanding them requires mapping. However, these embedded clauses are not so evaluated – we might understand that if John did not leave then Bill is wrong if he considers that John did leave, but the statement ‘Bill considers that John left’ is not asserting that John left and therefore the truth of this embedded clause is irrelevant to the truth of the matrix proposition which is judged as true or false depending on whether or not Bill believes that John has left. Therefore, focusing on mapping from words to objects does

not seem to be able to account for the observation that evaluation for truth takes place at the highest level of grammatical organisation (the matrix clause). Grounding the meaning of the lexeme in successful mappings does little to help because the lexeme is *not* necessary for truth judgements. Hence, whilst the meanings given primordially in being-in-the-world may be necessary for any assertion to be possible, they are not sufficient; they require grammatical organisation.

7.3 Indexing and Tense

In the first section of this chapter it was noted that Heidegger sought to ground the relation of correspondence in a more primordial truth of unconcealment. In doing so, he was attempting to answer a question that he had posed: “How is the statement able to correspond to something else, the thing, precisely by persisting in its own essence?” (Heidegger: 2009, 140) A statement is not ‘physically’ similar to what it indicates¹¹¹, and Heidegger points out that it cannot be the case that the statement *becomes* the object indicated, if only for the reason it would not thereby have a relation *to* the thing – hence: “In the correspondence the statement must first remain – indeed even first become – what it is. In what does its essence, so thoroughly different from every thing, consist?” (ibid., 140) If the preceding three chapters have some merit to them, then an answer to Heidegger’s question suggests itself: it is of the essence of assertions to have grammatical structure, and it is grammar which makes possible the relation of correspondence.

In the preceding chapters I have suggested that deictic reference to objects is grounded in embodied being-in-the-world, that verbs and aspectual meanings are grounded in our bodies’ motor processes, that both reference to objects and aspectual meanings have temporal patterns, and that we may grammatically schematise a lexeme as object or event by embedding it within the determiner or aspectual categories. The question of how it is possible for expressions and world to be in coincidence can therefore be given the Kantian answer that grammar makes the temporal structure of the lexeme ‘homogenous’ with that of the object or event. This answer also seems to take up Heidegger’s claim that a full explication of the “temporal characteristics of language-patterns” requires that the relation between “being and truth” is cast in terms of temporality (Heidegger: 2006, H349). This approach will now be applied to the grounding of the correspondence relation.

In the first place, the categories of aspect and determiner seem necessary to allow the statement to indicate an object. Both ‘this hammer drove the nail in’ and ‘that hammer would

¹¹¹ There is perhaps an exceptional set of cases consisting of sentences that indicate other sentences. And, as special instances of this sort of indication, there are also *self-referential* sentences.

not hit hard enough' can be taken to be true or false, and will be so partly in virtue of which hammer each statement is indicating – 'this' and 'that' serve to link the word 'hammer' to the hammer in question, allowing the hammers to be indicated. If I am correct in proposing that words such as 'this' and 'that' are grounded in embodied experience, then this indication is grounded in being-in-the-world. However, as I previously argued, there is arguably an irreducibly grammatical element to such indication which is pre-supposed by *human* embodied experience: the object and the indicative gesture must be understood to be bound together so that the gesture actually *does* indicate the object. The 'object-choice task' revealed that apes, despite an impressive array of abilities, seem to be incapable of grasping the significance of an indicative gesture. Hence, indications such as 'this hammer' and 'that hammer' *are* grounded in embodied being-in-the-world, but this being-in-the-world seems already imbued with a kind of grammar. Similarly, if aspect is grounded in the structure of the body's motor processes, thereby allowing (abstract) events to be understood in terms of the structure of our own actions, there seems to be presupposed an ability to divorce the common structures of executing schemas from the schemas themselves, i.e. to understand that 'running' and 'walking' both have iterative aspect in common but also that the root words are grounded in different parametrisations of the body's motor structures. The root words and the aspectual modifiers must be understood as bound together in any given expression, but also treated as distinct: the aspectual and the verb must be understood as each related to the other.

These grammatical categories therefore allow a statement such as 'the man is running' to be indexed – the initial determiner phrase indicates the man, and the aspectualised verb can be made homogenous to the iterated action of running that the man is engaging in. However, there is another grammatical category which seems to be essential to a full account of truth (though not a sufficient account): tense. That tense is important to truth has been observed by Hinzen and Sheehan (forthcoming) who note that where tense is missing it does not seem possible to attribute truth or falsity to an expression. They give the example of 'John considers [_{sc} him [a man]]' and point out that the small clause (SC) is not interpretable as true or false. The same, they continue, is also true for clauses with non-finite tenses, e.g. the small clause in 'John considers [_{sc} him to be [a man]]' (Hinzen and Sheehan: forthcoming, 305). Indeed, absent the matrix clauses within which these small clauses are embedded, both are simply ungrammatical – '*him a man' and '*him to be a man' immediately strike us as badly formed, despite that we could perhaps reinterpret them as 'he is a man'. An appreciation of the grammar of tense, I suggest, might permit elaboration of the 'Heideggerian' accounts of

truth developed by proponents of embodied cognition. To see why this is so, let us return to Barsalou's account in terms of mapping from simulation to situation (see above).

Although Barsalou has 'truth' and 'falsity' *originate* in mappings from simulation to perceived situation, he acknowledges elsewhere that it is not necessary for the *use* of 'truth' and 'falsity' that the situation actually be perceived. Barsalou identifies the following ways in which language 'indexes' situations (1999a, 67): 'immediate indexing', where conversationalists are simultaneously perceiving the indicated situation; 'displaced indexing on actual experience', where conversationalists are discussing an absent situation that they perceived earlier; 'displaced indexing on similar experience', where listeners have a situation described to them which has similarities to their own previous experiences; 'displaced indexing on componential experience', where listeners have a situation described which they have not experienced as a whole, but whose components have been parts of various previous experiences. Barsalou's account (1999b) therefore seems to account for immediate but not displaced indexing.

Immediate indexing seems bound to the present moment, i.e. the situation is happening at the time of the description. Displaced indexing on actual experience seems to be completely 'backward-looking', in each case the situation has happened *prior* to the description given in conversation. Displaced indexing on both similar and componential experiences are not bound to the present (unlike immediate indexing, the description does not occur at the time of the described situation), but seem to be able to index symbols to situations that have happened or are yet to happen. If I am correct in maintaining that it is grammatical structure which 'indexes' words, then the category of tense might be conceived as allowing immediate indexing (present tense), displaced indexing on actual experience (past tenses), and displaced indexing on similar and componential experiences (past and future tenses). If true, an analysis of tense might indicate that a more sophisticated 'taxonomy' of types of indexing is possible. The classic account of such tense-structures is Reichenbach's.

Reichenbach characterises tense as a form of "token-reflective symbol" (1947, 71) which locates events relative to three 'points': the point of speech (S), i.e. when the speaker utters their expression; the point of the event (E), i.e. when the event that is indicated by the utterance takes place; the point of reference (R), i.e. the point about which we take a perspective on the indicated event relative to the point of speech. For example, an utterance in the future perfect tense, e.g. 'I will have seen John', indicates an event E that is in the future relative to point S but is nonetheless indicated via point R, which lies further into the future relative to S than E does. Hence, in the future perfect tense our utterance at point S indicates

a future event E but about a reference point R, relative to which E comes before. It is possible for some or all of these points to be located at the same point in time, for example in the simple present tense, e.g. 'I see John', S, E, and R all are the present moment.

According to Reichenbach, the reference point R is particularly important in complex sentences that indicate multiple events – such sentences often demand “*the permanence of the reference point*” (ibid., 74). For example, an utterance such as 'I had mailed the letter when John came and told me the news' locates some event in the past, hence prior to point of speech S, however the first clause indicates an event E₁ (mailing the letter) further back than the events E₂ and E₃ indicated by the other two clauses (John coming and John telling me the news respectively). To make this possible we require a stable point of reference R which places E₁ prior to it and E₂ and E₃ simultaneous with it. Expressions that violate this and alter the point of reference appear badly formed, e.g. ‘*I had mailed the letter when John has come’.

Permanence of the reference point holds when the time relation between the reference points of the indicated events is identity, but this is, says Reichenbach, actually a special case of a more general “*positional use of the reference point*” (ibid., 76), where the time relation between the reference points is sequential (ibid., 75). When lexical conjunctions carrying temporal meaning (e.g. 'when', 'before', 'after', etc.) occur in complex utterances they serve to position reference points: “the reference point is used here as the carrier of the time position” (ibid., 75). Hence, in an utterance such as 'He was healthier when I saw him than he is now' has the events E₁ and E₂ indicated by the first two clauses as prior to the point of speech S, which is simultaneous with the event E₃ indicated by the third clause. However the three reference points do not all coincide: R₁ is simultaneous with E₁; R₂ is simultaneous with R₁ which is ensured by the word 'when'; R₃ is however simultaneous with S and E₃.

Tense, then, does not appear to be a category which schematises its embedded lexeme, but rather serves to specify the temporal 'location' of an event – to say 'someone will be walking' or that 'someone is walking' alters the location of the event in time relative to the speaker; it doesn't alter the temporal structure of the embedded verb. Tense is thus a *deictic* category, pointing to the temporal location of the event in time. Tense is therefore important to truth because it makes possible mappings to targets that are not immediately perceivable – use of the past and future tenses allows all three of Barsalou's types of displaced indexing. Further, the Reichenbachian point of reference can be invoked to illustrate that there are certain tenses which index events about a temporal point distinct from both the point of speech and the point of the event itself. For example, 'He will have run upstairs' asserts that at

some point in the future – the point of reference – the event of running upstairs will have been completed, but that this event took place *prior* to the point of reference though after the point of speech. This example though is still an assertion, and it is understood that at some point in the future it might or might not be revealed as true, and that what reveals it as true will be in the past relative to this future point.

7.4 Summary

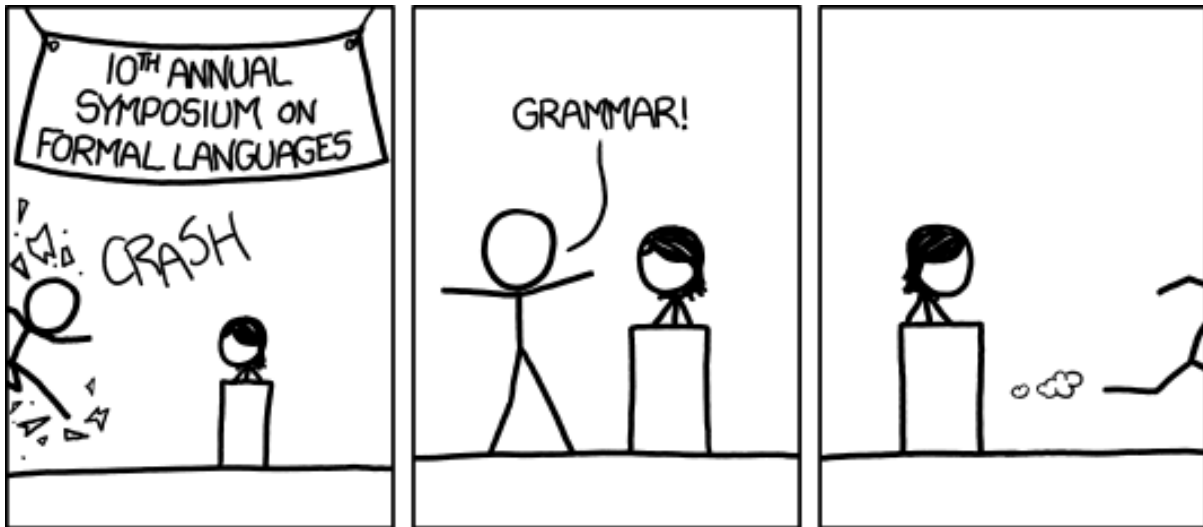
Heidegger claimed that the relation between “being and truth” needed to be cast in terms of temporality (Heidegger: 2006, H349). In preceding chapters I argued that determiners and aspect are grounded in embodied deixis and motor processes respectively, and that a lexeme may be schematised as an object or event via embedding within these categories. In my account of time-determination, I have taken up the idea of temporality as explaining how assertions may be brought into coincidence with the world: they may be so because their temporal structure is made, in Kant’s language, ‘homogenous’. However, the schematised events and objects seem to require being located in time – tense seems to perform this function and, as Hinzen and Sheehan (forthcoming, 305) noted, without tense it does not seem possible to attribute truth/falsity to expressions.

If tense locates events and objects in time and if, as I suggested in the previous chapter, grammar might perform the function of indexing words, then perhaps tense can be considered to index events and object to temporal locations. If this is true then instead of Barsalou’s (1999a) types of indexing, we might consider a more sophisticated taxonomy of indexing based on tense structures and incorporating the Reichenbachian ‘point of reference’.

Additionally, although this chapter has been broadly sympathetic to accounts of the ‘origin of truth’ based on indexing words to experience, I have attempted to illustrate that judgements of truth do not simply concern indexing as it is only the matrix expression that is evaluated for truth; embedded clauses are not open to such evaluation despite that they are presumably mapped or indexed to situations. Once again, this speaks to the importance of grammatical structure.

As the chapter’s title indicates, this is by no means a complete account of the ‘origin of truth’. One category that has been omitted is force – an assertion carries assertoric force, and this seems to be necessary for an account of truth (expressions with imperative or interrogative force do not seem evaluable for truth). Additionally, I have said nothing about copula sentences, e.g. ‘Hesperus is Phosphorus’.

8. Conclusions and Further Research



[HTTP://IMGS.XKCD.COM/COMICS/FORMAL_LANGUAGES.PNG](http://imgs.xkcd.com/comics/formal_languages.png)

In this thesis I have attempted to provide an approach to the problem of how the meaning of linguistic expressions, including assertions which convey truths, might be grounded in embodied being-in-the-world. As noted in the introduction, Merleau-Ponty worked on the problem of the 'origin of truth' for nineteen years but (to my knowledge) did not provide an account of how the move from pre-predicative experience to judgements of truth was to be effected. The embodied cognition research program, which emphasises non-symbolic explanations for our cognitive abilities (often using dynamical systems theory and connectionist networks), encounters a similar problem when faced with the human linguistic ability which does, on the face of it, seem to be a symbolic ability. Although I have remained sympathetic to the grounding of symbols in embodied experience, I also acknowledge the force of Chomsky's observation that a key feature of language is grammatical structure. I have therefore employed a highly abstract and minimal form of grammar to argue that words, grounded in our embodied being-in-the-world, may be related to each other via grammatical structure which thereby makes possible our capacity for assertions and, consequently, truth.

The first chapter was intended to give an overview of core themes throughout the thesis. In particular, 'Cartesian' methodological solipsism was contrasted with the 'situated' approach of existential phenomenology and the embodied cognition research program. The Cartesian approach gives rise to a series of dualisms, whereas the situated approach attempts to dissolve such dualisms. In the case of language, the Cartesian approach separates word and meaning, contrary to the perspectives of existential phenomenology, which considers words themselves to be meaningful, and the embodied cognition research program, which (in

parallel fashion) considers words to be cognitive 'building blocks'. On these non-Cartesian approaches, word-meanings are considered grounded in our embodied being-in-the-world. If word-meaning is so grounded, then we might trace the 'genesis' or 'origin' of our word meanings to structures of embodied experience. Therefore, aside from methodological concerns, the first chapter also introduced the idea of 'genetic' analysis. The theme of dissolving dualisms was continued in the second chapter, whilst genetic analyses were taken up in the fourth and fifth chapters.

Whereas the first chapter discussed the relation between word and meaning, the second chapter examined the relation between grammar and meaning. I adapt Merleau-Ponty's arguments against the perceptual constancy hypothesis to apply to a 'linguistic constancy hypothesis' – a constant link between word and meaning, or in the case of behaviourism, a stimulus and verbal response. In this chapter I drew on various examples to suggest that grammar structures meaning and our experience.

This raised the question of *what* grammatical structure actually is. The third chapter opened by examining the idea that language might be considered a dynamical system, with 'grammar' being the permissible trajectories through state space. Although this conception might overcome the difficulties faced by other sorts of grammars based on linear order (such as finite state Markov processes), it seems to fall short of capturing the structure-dependent nature of language. Hence they remain *weakly* generative. To achieve strong generativity, it seems at least a minimal notion of grammatical structure is required (which, in the minimalist program, is called 'merge'). This minimal operation would allow grammatical relations and might be a contender for the 'spark that lit the intellectual forest fire', i.e. the small change which allowed us to develop 'first generation' cognitive technology, and made possible the further development of our reasoning abilities.

Having established a minimal conception of grammar, the next two chapters were intended as a genetic analysis where determiners and aspect are argued to originate in embodied deixis and (following Narayanan) the general structure of our motor processes respectively. In the case of determiners, the deictic abilities of our own species were contrasted with those of apes, noting that apes seem to have very sophisticated abilities, but nonetheless are incapable of understanding the significance of a point toward an object – the 'object choice test' is highly revealing in this regard. In the case of aspect, I reviewed evidence from cognitive linguistics and computer simulations to argue that aspect is grounded in the generalised structure of our embodied motor processes.

Chapter 6, 'the Schematism', drew Kant's notion of 'time-determination' and used work in the previous two chapters to suggest that lexemes may be schematised as objects via determiners and as events via aspect. Temporal 'homogeneity' allows assertions to be brought 'into coincidence' with the world. The final section then drew upon certain Husserlian themes to argue that prior to pragmatics is grammatical structure – that grammar allows lexemes to be schematised, preserving an essential 'kernel' of meaning, but allowing the word to mean an object or event.

Finally, chapter 7 – 'Notes on Truth' – took up Heidegger's assertion that the relation between being and truth should be cast in terms of temporality (Heidegger: 2006, H349). The first section of the chapter discussed the relation of correspondence and the contention of a variety of thinkers that an account of truth must explain this relation, *not* assume that 'correspondence' is the explanation itself. Both Heidegger and Lakoff and Johnson maintain that our judgements of truth are characterised by a degree of relativity due to the grounding of these concepts in our embodied being-in-the-world. Although in this thesis I have accepted the grounding of our concepts in embodied being-in-the-world, the subsequent section of the chapter drew on work from the generative tradition – especially Hinzen and Sheehan – to show that only matrix clauses are evaluable for truth, and that embedded clauses are not evaluated for truth by the speaker or hearer. This seems to cause a problem for an account of truth based on mapping of words to percepts (such as Barsalou's) because embedded clauses are presumably still understood in terms of such mappings and therefore should presumably be evaluable in the same manner as the matrix clause. The final section of the chapter turned to the category of tense, suggesting that an analysis of tense-structures would provide a more sophisticated taxonomy of types of indexing.

Although I hope I have offered an interesting approach to the question of the origin of truth, I cannot claim that this thesis has solved it nor is in any way complete. The category of force, and specifically assertoric force, is also necessary for judgements of truth and it would certainly be interesting to inquire into the 'origin' of force. Further, it seems that other grammatical structures, such as prepositional phrases, might also be investigated via genetic analysis. These two categories are then discussed briefly as a possible further area of research below. I also discuss several areas which this research might be extended to. The first is writing – both the question of whether writing is itself a part of an extended cognitive process and the question of whether different writing systems have different cognitive effects. Next I turn to mathematics – the subject of Husserl's first book – and briefly discuss the possibility of a genetic analysis of number. Linking this with writing, I also mention the issue of

mathematical notation and whether this affects ‘mathematical reasoning’. The third area is the price mechanism, and whether our linguistic abilities account for the emergence of price and the social practises that it makes possible. Finally, I turn to a more traditional concern – the limits of human knowledge – and discuss the possibility of using this research for a ‘therapeutic’ purpose (in Wittgenstein’s sense).

8.1 Other Categories

Determiners, aspect, and tense were the three grammatical categories discussed in this thesis. One obvious extension to this work would therefore be to address a wider range of grammatical categories. Here I will discuss two – prepositions and force.

For example, prepositional phrases such as ‘in the cupboard’, ‘from London’, or ‘under the table’ seem to make use of the manner in which we conceptualise space. Talmy analysed multiple languages and argued that linguistic constructions in all languages can be broken down into primitive spatial relations. Whilst all languages might use these same primitive spatial relations, they might put these relations together in different ways, e.g. the English ‘on’ makes use of the primitives ‘above’, ‘contact’, and ‘support’ (see Feldman: 2008, 136). Further, the primitives can be grouped into three categories (see *ibid.*: 136-7): first, ‘topological’, where the ‘shape’ of a primitive relation may be changed without changing the primitive (e.g. a path may have its shape altered but it remains a path); second, ‘orientational’, where the primitive is defined relative to bodily orientation (e.g. ‘in front of’); third, ‘force dynamic’, where some use is made of force (e.g. ‘against’). As Feldman (*ibid.*, 137) notes: “What is important for our purposes is that all of these are embodied, with orientations such as *in front of* defined relative to beings with fronts, and force-dynamic schemas defined relative to how muscles and sensors operate.” An analysis of prepositions might focus on the role of the grounding of prepositions in such spatial primitives.

Another category – one which must certainly be taken into account for a more adequate approach to the ‘origin of truth’ – is that of ‘force’. Grammatical force includes ‘assertoric’, ‘interrogative’, and ‘imperative’. Truth and falsity seems to require assertoric force, for expressions of truth are assertions, e.g. ‘The present king of France is bald’. By contrast, neither interrogatives (e.g. ‘Is the present king of France bald?’) nor imperatives (e.g. ‘Shave the present king of France’s head!’) can be true or false. As noted in chapter 4, apes’ use of signs seems restricted to the imperative function, raising the question of whether abstract grammatical structure makes possible assertoric and interrogative force.

8.2 Writing

...at this moment I am writing, but I am not conscious of writing. Will someone say that habit has rendered me unconscious of the movements made by my hand in tracing the letters? That would be absurd. I may have the habit of writing, but not at all that of writing *such* words in *such* an order. In a general way, one should always distrust habit as an explanation. In reality, the art of writing is not at all unconscious, it is an actual structure of my consciousness. Only it is not conscious *of* itself. To write is to maintain an active awareness *of the words* as they come to birth under my pen. Not of the words inasmuch as they are written *by me*: I apprehend the words intuitively inasmuch as they have structural quality, that they emerge *ex nihilo* and yet do not create themselves, that they are passively created. At the actual moment when I write a word, I am not paying attention individually to each pothook formed under my hand. I am in a special state of attention, creative attention; I wait for the word, which I know in advance – to employ the hand that is writing and the pothooks it is tracing, and thus to realise itself. (Sartre: 1962, 59)

Sartre makes (at least) two interesting claims in the quoted passage which might serve as fruitful starting points for extending the work of this thesis: first, that the “art of writing” is “an actual structure of my consciousness”; second, that the word employs the hand to realise itself.

From the perspective of extended cognition, Menary (2007) gives two claims which run parallel to Sartre’s. First, Menary claims that the *act* of writing is a process of thinking as much as the act of speech can be considered as such (2007, 622). The first claims of Sartre and Menary are consistent with the view of language (and grammar) assumed by this thesis as constitutive of thought and/or consciousness, but with the twist that the *mode* of linguistic form – written, oral, etc. – is now being brought under closer inspection to analysis. In order for this topic to be an interesting extension, the structures of consciousness realised through writing must be qualitatively distinct from those present in linguistic but illiterate agents.

Menary’s second claim concerns the importance of written ‘vehicles’, i.e. meaningful physical structures that are actively created and manipulated for an agent’s purposes. In a sense, this parallels Sartre’s second claim that the word realises itself, that “I apprehend the words intuitively inasmuch as they have structural quality”, for our writing presupposes a store of forms available for us to manipulate: we do not (usually) create such forms ourselves, but take up those which have been provided to us. Equally, Menary’s vehicles are – crucially, for the extended cognition theory – *not* simply ‘outputs’ of an internal mental act, but rather an integral part of the mental process itself: “they shape the cycle of processing that constitutes a mental act” (ibid., 622). Menary follows Merlin Donald who refers to such external vehicles as ‘exograms’, in contrast to neural ‘engrams’. Importantly, whilst exograms

do allow greater memory (storage) capacity, this is not their main benefit. Rather, they give rise to new cognitive capacities by allowing a novel range of operations and manipulations (ibid., 625).

The questions are, first, what does written language add to consciousness and cognition beyond what is given by the spoken word, and, second, whether distinct systems of written language differ significantly in the form or degree of cognition granted.

An answer to the first question might be that by ‘solidifying’ in writing what was previously – in speech – fleeting, language can become an exogram, i.e. an object for consciousness and mental operations, for the first time (recall that objects, for Kant and Heidegger, are objects insofar as they persist through time).¹¹² Gleick, for example, notes how the Greeks, following the invention of the alphabet, “created *categories* (this word originally meaning ‘accusations’ or ‘predications’) as a means of classifying animal species, insects, and fishes” from which “they could then classify ideas” (Gleick: 2012, 36). A case might be made that exograms are required for the formation of superordinate categories or, on the level of conscious experience, that the “written word – the persistent word – was a prerequisite for conscious thought as we understand it” (ibid., 37).

Exograms might then be created by writing, but this raises the second question of whether different writing systems produce significantly different exograms, i.e. exograms which constrain or enhance cognition to differing degrees. Perhaps it is the case that the structure of the writing system might allow different types of mental operations to be performed on the exograms. For example, Egyptian hieroglyphs¹¹³ work according to the ‘rebus principle’ where the signs are ‘phonograms’ which indicate the sound of the name of a thing, rather than naming the thing itself – “as if we were to write the English word belief with a picture of a bee and a leaf” (Collier et al.: 1998, 2). The rebus principle is also present in Sumerian: a tablet found in 1926-8 depicted a reed at the start of a list of temple goods which makes little sense until it is realised that the same sound for ‘reed’ – ‘*gi*’ – also means ‘render’ or ‘repay’ (Man: 2009, 55). Returning to Egyptian hieroglyphs, signs may be placed over one another to fill the available space in a pleasing manner (Collier et al.: 1998, 4) and hieroglyphics often requires the presence of ‘determinatives’ to indicate what sort of object is being referred to by the phonograms (ibid., 5). This allowed a “terribly clever, perhaps witty” way to assert the omnipresence of the ram-god Khnum in a prayer written in the temple of

¹¹² It is interesting to note therefore that in Egyptian hieroglyphics the presence of a depicted small roll of papyrus indicates that an abstract concept is being communicated rather than a tangible object (Collier et al.: 1998, 6). This papyrus roll therefore is a ‘determinative’ – see below.

¹¹³ According to Man, during the fifteenth century, when Egyptian hieroglyphs were very much mysterious, the idea arose that this writing system was the ‘purest’ form of communication (Man: 2009, 29).

Esna: “every single sign is a ram, with the sense dictated by the determinatives” (Man: 2009, 69).

The structure of the Egyptian system allowed this sort of pun which seems impossible in the alphabetic writing system used by English. But, does the alphabetic system allow for more fluid and flexible manipulation of exograms? Does the Egyptian system differ significantly in this respect not only with the Roman alphabet, but also with Chinese ideographic script, or, say, Korean Hangul? I cannot attempt to answer these questions here, but it is interesting to note the possible direction of further research.

8.3 Mathematics

An obvious extension to this thesis is to the investigation of ‘mathematical reasoning’ and, in the realm of extended cognition, whether the differing systems of mathematical exograms result in differing degrees of mathematical ability. Within phenomenology, there is a definite and obvious precedent for the investigation of ‘mathematical reason’: Husserl’s *Philosophy of Arithmetic*. As Mohanty points out, although Husserl’s genetic phenomenology was explicitly developed later in his career the themes are presented in a manner that is “reminiscent” of Husserl’s first book: “that the finite mind, in dealing with what cannot be intuitively grasped, takes to symbolic thinking” (Mohanty: 2006, 73). The question of how it is that we reason mathematically is particularly interesting in virtue of the ‘unreasonable effectiveness of mathematics in the natural sciences’ – Wigner wrote that “mathematical concepts turn up in entirely unexpected connections” and that “the enormous usefulness of mathematics in the natural sciences is something bordering on the mysterious” (1960, 2). Wigner concluded:

The miracle of the appropriateness of the language of mathematics for the formulation of the laws of physics is a wonderful gift which we neither understand nor deserve. We should be grateful for it and hope that it will remain valid in future research and that it will extend, for better or for worse, to our pleasure even though perhaps also to our bafflement, to wide branches of learning. (ibid., 14)

Wigner’s point seems to presuppose the subject-object dualism: If mathematical concepts are human creations used to describe what is given in perception, i.e. the subjective, then why do they match so reliably to the deeper structures of reality, i.e. the objective, which are beyond our (unaugmented) perceptual capabilities? In contrast to this perspective, would it be possible to ground mathematical reasoning in being-in-the-world? If so – if mathematical reasoning is grounded in the structure of the world analogously to how I have suggested

certain linguistic categories are grounded – would this go some way toward explaining mathematics’ ‘unreasonable effectiveness’?

A possible point of departure from the point of view of embodied cognition might be Lakoff and Núñez’s *Where Mathematics Comes From* (2000). According to the authors, mathematical reasoning arises by employing basic embodied abilities and concepts and extending them via metaphor and blending to new domains. For example, in accounting for the psychological origin of the infinite set of natural numbers, Lakoff and Núñez claim the infinite set originates via mappings from the target domain of ‘iterated processes’, referring to the aspectual iterate option in Narayanan’s controller x-schema (Lakoff and Núñez: 2000, 174; see also Narayanan: 1997 and chapter 5, above). Lakoff uses x-schema controller nodes to characterise the procedure for reaching the set of all natural numbers as follows (2003, 95):

- Let the initial starting state be the empty set
- The starting action is to produce the number 1 and form a union of the set containing 1 with the empty set
- The iterated central action is add 1 to the previously produced number and form that union of the set containing that number with the previously formed sets
- The final state is the set of *all* natural numbers

A detailed analysis of Lakoff and Núñez’s theory is beyond the scope of a brief few passages on possible extensions to the research of this thesis. However, it is worth noting that in their account of the development of arithmetic, Lakoff and Núñez point to the basic ability shared by humans and many animals to subitise – i.e. the ability to tell “at a glance whether there are one, two, or three objects before them” (Lakoff and Núñez: 2000, 19). However, it does not seem obvious that subitising is sufficient to ground the meaning of number words. Comparison with the Pirahã is very interesting in this regard. Pirahã uses the following counting system (see Gordon: 2004): ‘hói’ (pronounced with a falling tone) might be translated as ‘one’, though it is often used to simply denote a small quantity¹¹⁴; ‘hoi’ (pronounced with a rising tone) could perhaps be translated as ‘two’, though its use is also inconsistent and it is often used to simply denote a larger quantity than that described as ‘hói’; ‘baagi’ and ‘aibai’ designate any quantity larger than two, and may be translated as ‘many’ or perhaps ‘lots’. Importantly, the Pirahã number system is *not* a recursive base-2 system, i.e. the words are never used in combinations such as ‘hoi- hoi’ to denote four (Gordon: 2004, 497). The Pirahã can recognise certain Portuguese number words to be part of the language spoken by Brazilians, however they simply do not understand the words’

¹¹⁴ ‘Hói’ can also mean ‘small’, contrasting with ‘ogii’ (‘big’). This suggests “that the distinction between discrete and continuous quantification is quite fuzzy in the Pirahã language” (Gordon: 2004, 497).

meaning (ibid.). The absence of numerical terms might explain why the Pirahã have extreme difficulty with exercises such as matching tasks (where they are shown a ‘sample array’ of, e.g., five batteries and are asked to produce a ‘matching array’, i.e. select another five batteries). Gordon conducted a series of such tests and concluded that the “[t]he results of these studies show that the Pirahã’s impoverished counting system limited their ability to enumerate exact quantities when set sizes exceed two or three items” (Gordon: 2004, 498).

For the purposes of this brief section, the comparison illustrates that although the Pirahã appear to be proficient at subitising, being completely capable of making basic quantitative distinctions, and although they are no doubt capable of iterated motor processes, they obviously have extreme difficulty with numerical concepts. However it is not immediately obvious, on Lakoff and Núñez’s account why this should be so. An interesting conjecture is that numerical concepts require more structure than subitising and iterating provide, which raises the possibility that more *structure* is required than just an iterated activity – recall from chapter 3 that a finite state machine could enter an infinite loop, reiterating the same state. An alternative, then, might be to presuppose that abstract grammatical structure makes possible our mathematical symbols.

This research would therefore probably benefit from a detailed analysis of Chomsky’s proposal that a basic grammatical operation – merge – is capable of generating the natural numbers. It is generally assumed by generative linguistics that merge is a binary operation (see Introduction, above), however Chomsky maintains that if merge is restricted to a unary operation then merge “yields the successor function, from which the rest of the theory of natural numbers can be developed in familiar ways” (2004c, 16). Hinzen gives a demonstration of how merge might yield the successor function and generate the natural numbers:

...take von Neumann’s theory of ordinals, in which ordinals are built up recursively from a single object, say the empty set $\emptyset = \{\}$. Applying merge qua set-formation to this single object, it yields the singleton set $\{\emptyset\}$, a set different from the empty set in containing exactly one object, the empty set itself. Since merge is recursive, it can be applied again to that second object, $\{\emptyset\}$, to yield a set that contains that very set $\{\emptyset\}$, plus its single member $\{\emptyset, \{\emptyset\}\}$. Applied to that object once more, it yields the set $\{\emptyset, \{\emptyset, \{\emptyset\}\}\}$, and so on. We may then think of this series as being associated with the series 0, 1, 2, 3,..., which goes on *ad infinitum*... (Hinzen: 2006, 190)

Given that the arguments of this thesis have been heavily influenced by generative grammar, Chomsky’s suggestion might play a critical role in such analysis.

It might also be asked, linking this possible research on mathematics with that on writing (above), whether mathematical *notation* significantly affects the possible space of

research. A story which suggests this might be worth investigating comes from Gleick (2012) and concerns the different formulations of calculus: that of Newton, on the one hand; that of Leibniz, on the other. In England, the Newtonian notation appears to have been considered 'sacred': "The English professoriate 'regarded any attempt at innovation as a sin against the memory of Newton', one nineteenth century mathematician said" (Gleick: 2012, 89). When Charles Babbage arrived as a student at Trinity College, Cambridge, he was "immediately disappointed: he discovered that he already knew more of the modern subject than his tutors, and the further knowledge he sought was not to be found there, maybe not anywhere in England" (ibid.). Babbage had to use specialist book shops to import books from France, namely Lagrange's *Theorie des Fonctions Analytique* and Lacroix's work on the *Differential and Integral Calculus*.

Although Newton and Leibniz produced different formulations of the calculus, their work was mathematically equivalent (there is only one calculus). "But", notes Gleick, "they had devised incompatible systems of notation... and in practice these surface differences mattered more than the underlying sameness" (2012, 89): the implication appears to be that English mathematics was stagnating due to its inferior notational system. Babbage, however, had made himself fluent in both the "dots of Newton" and the "*d*'s of Leibniz" and along with John Herschel and George Peacock formed the 'Analytical Society' for the "propagation of *d*'s" and the "heresy of dots" (Gleick: 2012, 90). According to Gleick

...their evangelism worked: the new methods spread from the bottom up, students learning faster than their teachers. 'The brows of many a Cambridge moderator were elevated, half in ire, half in admiration, at the unusual system which began to appear in the examination papers', wrote Herschel. The dots of Newton faded from the scene, his fluxions replaced by the notation and language of Leibniz. (Gleick: 2012, 91)

If Gleick's description is true, then it seems Babbage, Herschel, and Peacock were able to bring English mathematics up to date by adopting a superior system of notation. We might therefore ask whether the *d*'s and dots – and mathematical symbols in general – are exograms, and, if so, whether and why the different systems of notation allowed different types of mental operations to be performed.

8.4 'Social Cognition': The Price Mechanism

Extended cognition has contributed to economics before. It has taken as its starting point findings from institutional economics such as the observation that changing the institutional structures within which agents operate yields superior gains in efficiency compared to altering the intelligence-level of the agents themselves. When 'zero intelligence'

bots are replaced with humans there is only a negligible gain in efficiency, but altering the structure within which these agents may interact creates a significant efficiency gain: “Adam Smith’s invisible hand may be more powerful than some may have thought; it can generate aggregate rationality not only from individual rationality but also from individual irrationality” (Gode and Sunder: 1993, 119). Clark interprets such efficiency gains by claiming economic institutions serve as ‘scaffolds’ which constrain the possible space of decisions, and thereby links the evolution of economic institutions to stigmergic algorithms where individual “actions are strongly determined by external structures which are themselves the *operands* or objects of the actions” (Clark: 1997a, 279; see also Clark: 1997b).

This research is (I believe) very interesting. However, based on the arguments of this thesis, I wish to discuss another possible application for extended cognition: monetary economics. Money, I suggest, might be interpreted – alongside written and mathematical symbols – as a potential exogram, i.e. a meaningful external vehicle of thought. Money’s essential function appears to be that of a medium of exchange. However, in the ‘socialist calculation debates’ of the 1920s and 30s, economists from the Austrian school drew attention to the role of money in ‘economic calculation’ and used such insights to level a critique at socialism (which is crucially defined as public ownership of *all* the *means* of production): in a centrally planned economy, there exists no means of rationally allocating resources during a productive process – resources are undoubtedly allocated, but the allocation will be *arbitrary*, for there will exist no rational criteria. (It is perhaps worth emphasising that although this argument was given within the context of the *socialist* calculation debate, the same criticism may also be levelled at a sufficiently large private firm – the necessary condition, implicit in the argument below, is that the firm own a sufficiently large part of the means of production relative to the goods which it produces.)

In a socialist economy, goes the Austrian argument, because all production is owned by the same entity no genuine prices would exist between the different parts of the production process (e.g. between those that make steel and those that use steel to make cars). Prices are ratios of exchange *between* agents, and hence, if the entire productive process is controlled by a *single* agent, no genuine exchange ratios, i.e. no prices, can be established. However, prices are essential in coordinating economic activity:

Fundamentally, in a system in which the knowledge of the relevant facts is dispersed among many people, prices can act to co-ordinate the separate actions of different people... Assume that somewhere in the world a new opportunity for the use of some raw material, say, tin, has arisen, or that one of the sources of supply of tin has been eliminated. It does not matter for our

purpose – and it is significant that it does not matter – which of these two causes has made tin more scarce. All that the users of tin need to know is that some of the tin they used to consume is now more profitably employed elsewhere and that, in consequence, they must economise tin. (Hayek: 2009, 85)

Price signals thereby coordinate the activity of numerous individual agents allowing a rational allocation of resources despite no central command structure. Resources flow to where they are needed based the relative demand of agents within the economy which are themselves constantly changing due to nature of the ever-changing world, and the dispersed price mechanism thereby permits fluid, real-time response despite no individual agent needing to know why resources are moving in the manner which they are. Accordingly, money is considered a (very minimal) unit of *information*:

We must look at the price system as... a mechanism for communicating information if we want to understand its real function... The most significant fact about this system is the economy of knowledge with which it operates, or how little the individual participants need to know in order to be able to take the right action. In abbreviated form, by a kind of *symbol*, only the most essential information is passed on and passed on only to those concerned. (ibid., 86 *italics mine*)

Considering money to be a form of information is not yet to consider money an exogram, as a unit of information could simply be an object of judgement as opposed to (partly) constitutive of the judgement itself. Claiming that money is an exogram is to take Hayek's claim further and investigate first, to what extent money may be used to *think* and, second, to what extent grammatical structure is necessary for the production of such symbols.

Regarding the first point, initial evidence that 'money' does indeed augment cognition comes from the some experiments performed with capuchin monkeys. Experimenters trained capuchins to consider tokens as valuable by exchange them for sugary food whenever a capuchin had picked one up. Adessi and Rossi (2011) found tokens, like Arabic numerals (see chapter 4), improved performance of capuchin monkeys in reverse-reward contingency tasks: "tokens allowed capuchins to achieve psychological distancing from the incentive features of food, leading them to avoid impulsive choices in favour of more advantageous alternatives" (2011, 853; see also J. Anderson et al.: 2008).

Just as I suggested earlier (see chapter 4) that the restrictions on apes' use of symbols may a result of their lacking grammatical capacities, it is interesting consider whether the creation of price requires using particular grammatical structures. With regards to this second point, observations of the Pirahã's trading practices are perhaps revealing:

Riverboats come regularly to the Pirahã villages during the Brazil nut season. This contact has probably been going on for more than 200 years. Pirahã men collect Brazil nuts and store them around their village for trade... They will point at goods on the boat until the owner says that they have been paid in full. They will remember the items they received (but not exact quantities) and tell me and other Pirahã what transpired, looking for confirmation that they got a good deal. There is little connection, however, between the amount they bring to trade and the amount they ask for. (Everett: 2005, 626)

No doubt the lack of number terms in Pirahã is important here (see previous section), but in order to understand price we presumably must be able to combine into a single unit (at least) a number word with an object word, e.g. '3 apples' or 'two pounds'. Again, I shall not discuss this any further here, but it seems that a possible extension of this thesis into the nature and psychology of economic agents is possible.

8.5 Language and the Limits of Understanding

Human children, growing up in a human community, will learn the language of that community. Kittens and saplings, growing up in that same community, will not acquire language. Just as it seems undeniable that humans have some capacity allowing language acquisition – referred to by generative linguists as the faculty of language (FL) – it also seems undeniable that humans are capable of forming (naturalistic) theories about the nature of the world. We have certain mental abilities allowing ourselves to engage in naturalistic inquiry, and therefore certain aspects of the mind which enter into such inquiry: “call them ‘the science forming faculty’ (SFF)” (Chomsky: 2005b, 82). Chomsky calls those questions SFF is capable of answering ‘problems’; those outside its scope are ‘mysteries’. SFF is capable of asking about both problems and mysteries, but it is only capable of resolving problems – mysteries simply lie beyond our capacities (ibid., 83). The successful sciences are therefore considered to “fall within SFF and the nature of the world” (ibid.). Whilst there might be limits to the scope of human knowledge, i.e. to the scope of SFF, there is “no contradiction” in assuming that SFF might enable us to understand its own limits (ibid.).

Chomsky’s theories of FL and his speculations on SFF might find parallels in Kant’s account of the faculties of understanding and reason. Gardner (1999, 25) usefully identifies the three major divisions of Kant’s *Critique of Pure Reason*: the ‘transcendental aesthetic’, which is concerned with the faculty of sensibility (the source of our sensory representations); the ‘transcendental analytic’, concerned with the faculty of understanding (the source of our conceptual representations); the ‘transcendental dialectic’, concerned with the faculty of reason (the source of the unity of our knowledge). In the Kantian system, sets of sensory

‘intuitions’ are subsumed under particular concepts in acts of judgement by the understanding, and in turn these judgments are united into systematic theories by reason: “what reason decrees and tries to bring about... is the systematic character of cognition, i.e. its coherence based on a principle” (Kant: 1996, A645/B673).

FL, then, might be likened to the faculty of understanding in that both are concerned with intelligibility: FL makes linguistic structures intelligible; understanding makes cognition of objects possible. (An importance difference is that FL, for Chomsky, is not equivalent to thought, whereas, for Kant, the understanding *is* thought.) Additionally, as reason systematically unites the acts of understanding according to given principles, SFF systematically investigate the realms of nature. But, for both Kant and Chomsky, the architecture of cognition necessarily imposes certain limits of the possible sphere of human knowledge, and, for both thinkers, it is no contradiction to suppose that we may pose questions which we lack the capacity to answer. Given that Chomsky (to my knowledge) has not written extensively on SFF whilst Kant devoted the third part of the *Critique* to the faculty of reason, I will confine my discussion to Kant for the remainder of this section and explain, first, how Kant believed reason may overstep its limits and, second, how Kant believed these limits were imposed by the schemata.

The opening lines of Kant’s *Critique* read: “Human reason has a peculiar fate in one kind of its cognitions: it is troubled by questions that it cannot dismiss, because they are posed to it by the nature of reason itself, but that it also cannot answer, because they surpass human reason’s every ability” (Avii). Illusion therefore “attaches to human reason unpreventably and that, even after we have uncovered this deception, still will not stop hoodwinking and thrusting reason incessantly into momentary aberrations that always need to be removed” (A298/B354). Kant’s discussion of the faculty of reason in the transcendental dialectic was therefore primarily concerned with delineating and making explicit the boundaries of possible human knowledge.

In an earlier section of the *Critique*, Kant had argued that two types of representations – intuitions, given by the faculty of sensibility, and concepts, given by the faculty of understanding – are necessary for knowledge:

Without sensibility no object would be given... without understanding no object would be thought. Thoughts without content are empty; intuitions without concepts are blind. Hence it is just as necessary that we make our concepts sensible (i.e. that we add the object to them in intuition) as it is necessary that we make our intuitions understandable (i.e. that we bring them under concepts)... The understanding cannot intuit anything, and the senses cannot think anything. Only from their union can cognition arise. (A51/B75)

Whilst Kant therefore deemed judgements – subsumption of sensory intuitions under the concepts of the understanding – necessary for knowledge, he did not consider them sufficient. Judgements must be given theoretical unity or coherence, and this requires the faculty of reason: “without reason we would have no coherent use of the understanding, and in the absence of such use would have no sufficient mark of empirical truth” (A651/B979). Reason has two functions to produce such coherence. First, a “merely formal” or “logical” function where it “abstracts from all content of cognition” and makes “mediate inferences” (A299/B355), i.e. engages in syllogistic inferences.¹¹⁵ Second, “a transcendental power” (A299/B356), which is the power of “providing unity of the rules of understanding under principles” (A302/B359). Importantly, Kant believes that reason has no *direct* access to sensibility (i.e. to intuitions), but rather “refers directly to understanding and its judgements” (A306/B363).

Syllogistic reasoning, the first function, therefore operates on the judgements of the understanding, discerning the necessary implications of our judgements. But any given example of syllogistic reasoning might itself be based on the outcome of prior syllogistic reasoning.¹¹⁶ Reason’s second power, then, is transcendental in that, given an object of experience (which is therefore an object of judgement – see above), reason will attempt to discern the conditions explaining that object. As Gardner puts it: “Reason thus assumes its own cognitive motivation: it has to *discover the conditions* under which objects are as they are, and our judgements are true” (Gardner: 1999, 217).

Hence, Kant claims the faculty of reason posits, first, that there are no insurmountable gaps in chains of syllogisms, and, second, that every chain of inference is carried back from the given ‘conditioned’ object to an ‘unconditioned’ first premise, i.e. a premise itself not derived from syllogistic inference (Guyer: 2006, 131). Reason is therefore led to postulate “the concept of the *totality of conditions* [i.e. the entire sequence of conditions from the object to the unconditioned first premise] for a given conditioned [object]” (A322/B378; see also A307/B364). Accordingly, Kant writes that “the *unconditioned* makes possible the totality of conditions; and, conversely, the totality of conditions is always itself unconditioned” (A322/B378). However, although reason postulates the principle of the totality of conditions, such a *totality* of all conditions is incapable of being given in *intuition*.

¹¹⁵ For example: “All men are mortal. Socrates is a man. Therefore, Socrates is mortal.”

¹¹⁶ The conclusion ‘Socrates is mortal’ was reached from the premise ‘Socrates is a man’. However this premise might itself have been reached via another syllogism. For example: “All featherless bipeds are men. Socrates is a featherless biped. Therefore, Socrates is a man.”

Because knowledge requires concepts to have sensible objects, the unconditioned “impels us to go beyond the boundary of experience” (BXX) and hence all knowledge. The scope of our possible thought therefore exceeds that of our possible knowledge (Gardner: 1999, 210), and we are susceptible to a form of transcendental illusion¹¹⁷ where concepts not meant for use outside experience are employed as if they were (ibid., 215): immanent principles “whose application keeps altogether within the limits of possible experience” (A295/B352) are employed to investigate transcendent objects, i.e. those which lie outside possible experience. We thereby fall victim to the “deception of there being an expansion of *pure understanding*” (A295/B351).

Ultimately, it is the schemata that constrain knowledge: “The schemata of the pure concepts of understanding are... the true and sole conditions for providing these concepts with a reference to objects and hence with *signification*” (A146/B185). In other words, the categories must be schematised in order to ‘realised’, but such schematisation implies that “in the end, [they have] no other use than a possible empirical one” (A146/B185). It should be self-evident that the postulated, unconditioned totalities of causes may not be given in intuition (if only because a cause is a schematisation into temporal succession according to a rule of the concept of the pure understanding – by definition it is not an intuition). However, it also implies that we know the objects of the world only as they are conditioned by our conceptual architecture – we cannot know them independent our own conceptual apparatus. We have no access to the ‘things-in-themselves’, only ‘phenomena’, or appearances, produced by our perceptual-cognitive apparatus: “a schema is, properly speaking, only the phenomenon of an object, or the sensible concept of an object, in harmony with the category” (A146/B186).

My account of schemata given in this thesis (see chapter 6, above) is an attempt to situate this part of the Kantian system within a new framework: lexemes are made into objects or events in virtue of being translated into certain temporal forms, accomplished by determiners and aspect. But, given this thesis is presented with the framework of existential phenomenology and embodied cognition, the Kantian distinction between the appearances of things and the ‘things-in-themselves’ is inconsistent with the rest of the thesis (see chapter 1). Accordingly, before outlining how the ideas presented in this thesis might turned to investigate the limits of knowledge, it is necessary to understand how, in the absence of the phenomenal/noumenal dualism, the Kantian idea of the limits of human cognition might itself be so adapted to be compatible with the approach of existential phenomenology.

¹¹⁷ Transcendental illusions are be distinguished from empirical, e.g. optical, illusions (A295/B351).

This project might take inspiration from Husserl's genetic phenomenology. Although the Kantian 'things-in-themselves' were unacceptable to Husserl – his 'principle of all principles' required tracing concepts back to things given in direct experience, rendering the very notion of a Kantian 'thing-in-itself' meaningless (see chapter 1) – he nonetheless wished to trace all concepts back to the 'things themselves' given in 'self-evident fully fledged intuitions':

Meanings inspired by remote, confused, inauthentic intuitions – if by any intuitions at all – are not enough: we must go back to the 'things themselves'. We desire to render self-evident in fully-fledged intuitions that what is here given in actually performed abstractions is what the word meanings in our expression of the law really and truly stand for. (Husserl: 2001a, 168)

Husserl's criticism of Kant appears to be in line with the interpretations and criticisms of Kantian philosophy given shortly after Kant's first *Critique* was published: Kant cannot give an account of how the faculties of sensibility and understanding are unified in the subject.¹¹⁸ For Kant, this relation lies outside all experience and, by extension, all possible knowledge (hence, no account is possible). The result is an unsurpassable appearance/reality dualism (see Guyer: 2005, §III-IV). Because Husserl believes all our concepts must have their genesis in intuition, and because Kant's philosophy forbids an account of the relation between concepts and intuitions, Husserl believed Kant's account to be "confusing" and "mythic" (Husserl: 2001a, §58). For Husserl, who redefined 'things-in-themselves' and held that – via the epoché – a return to the things themselves is perfectly possible (see chapter 1, 'Introduction', above and Philipse: 2006, §XII-III), we can indeed, via genetic analysis, compare our beliefs and concepts with what is given in self-evident (eidetic) intuitions: "Knowledge is not a modifying but an apprehending function, and nothing stands in the way of comparing the object with our thought of it, and finding them to 'agree' (or not)" (Willard: 2006, 157). This alone, believes Husserl, makes possible a phenomenology of reason (ibid.).

Such a phenomenology of reason appears to be a promising manner in which to extend the thesis as I have essentially followed Husserl in attempting to trace the meaning of lexical items and grammatical categories to pre-predicative experience. The 'originary' sense of a lexical item might be said to be given in experience, but, crucially, it need not be schematised into the same temporal form as that initially given – something given originally in experience as an object might be schematised as an event and vice versa (see chapter 6, above). Grammar might thereby make possible significant divergences between an object and

¹¹⁸ See Guyer (2005, §I) for an overview of Hegel's criticisms, and Franks (2005) for an account of how this concern originated in Kant's contemporaries and immediate successors.

'our thought of it'. If we mistakenly accept a certain schematisation as an adequate apprehension for the thing itself we might systematically think nonsensically about it.

Such an extension might ultimately be considered 'Wittgensteinian' in nature: In the preface to the *Tractatus Logico-Philosophicus*, Wittgenstein wrote that "the aim of this book is to draw a limit to thought, or rather – not to thought, but to the expression of thoughts: for in order to be able to draw a limit to thought, we would have to find both sides of the limit thinkable (i.e. we should have to be able to think what cannot be thought)" (2005, 3). Furthermore: "It will therefore only be in language that the limit can be drawn, and what lies on the other side of the limit will simply be nonsense" (ibid. 4). Although these remarks were written by the 'early' Wittgenstein, his later work displayed a continued interest in such 'nonsense'. Indeed, Wittgenstein considered the aim of his philosophy to be "to teach you to pass from a piece of disguised nonsense to something that is patent nonsense" (Wittgenstein: 2001, §464).

Early Wittgenstein diagnosed the problems of philosophy as arising "from our failure to understand the logic of our language" (2005, §4.003), and later Wittgenstein continued this theme, maintaining that problems arise from "certain analogies between the forms of expression in different regions of language" (2001, §90; see also Fogelin: 2005, 34). Clarifying the logic, for early Wittgenstein, or grammar, for later Wittgenstein, of our language should thereby reveal that the issues we take to be problems are in fact not problems at all (Richter: 2004, 12). Therefore the "results of philosophy" can be seen to be "the uncovering of one or another piece of plain nonsense and bumps that the understanding has got by running its head up against the limits of language" (Wittgenstein: 2001, §119). This approach seems to have been (at least, partly) inspired by Freud, with whom one of Wittgenstein's sisters had undergone therapy. Wittgenstein was immensely interested in the psychotherapy – despite his hostility to Freud's theoretical explanations¹¹⁹ – and came to see his own work as 'therapeutic' in nature (2001, §133; see also Sluga: 2005, 14).

A phenomenology of reason, discerning the limits of understanding, might serve a therapeutic function in Wittgenstein's sense. Identifying the processes in which we may use our grammar to schematise a concept into a temporal form that does not agree with the thing itself might allow us to spot instances of such problematic modes of thought. These problematic judgements might be identified and dissolved

¹¹⁹ Wittgenstein wrote that "Freud's fanciful pseudo-explanations (precisely because they are brilliant) perform a disservice. (Now any ass has these pictures available to use in 'explaining' symptoms of illness.)" (Wittgenstein: 1980, 55^e)

by looking into the workings of our language, and that in such a way as to make us recognise those workings: *in spite of* an urge to misunderstand them. The problems are solved, not by reporting new experience, but by arranging what we had always known. Philosophy is a battle against the bewitchment of our intelligence by means of our language. (Wittgenstein: 2001, §109)

Bibliography

- Adessi, Elsa, and Sabrina Rossi. 2011. 'Tokens Improve Capuchin Performance in the Reverse-Reward Contingency Task' in *Proceedings of the Royal Society: Biological Sciences*, 278, pp. 849-854
- Aitchinson, Jean. 2011. *The Articulate Mammal* [Oxford, Routledge]
- Akhtar, Nameera, Malinder Carpenter and Michael Tomasello. 1996. 'The Role of Discourse Novelty in Early Word Learning' in *Child Development*, Vol. 67, No. 2, pp. 635-645
- Anderson, James R., Yuko Hattori, Kazuo Fujita. 2008. 'Quality Before Quantity: Rapid Learning of Reverse-Reward Contingency by Capuchin Monkeys (*Cebus apella*)' in *Journal of Comparative Psychology*, Vol. 122, pp. 445-8
- Anderson, S., T. Matlock, C. M. Fausey, and M. J. Spivey. 2008. 'On the Path to Understanding the On-Line Processing of Grammatical Aspect' in *Proceedings of the 30th Annual Meeting of the Cognitive Science Society*, pp. 2253-2258
- Arsenijevic, Boban, and Wolfram Hinzen.
- 2012. 'On the Absence of X-Within-X Recursion in Human Grammar' in *Linguistic Inquiry*, Vol.43, pp.423-440
 - 2010. 'Recursion as a Human Universal and as a Primitive' in *Biolinguistics*, Vol. 4, pp. 165-173
- Ballard, Dana H., Mary M. Hayhoe, Polly K. Pook, and Rajesh P. N. Rao. 1997. 'Deictic Codes for the Embodiment of Cognition' in *Behavioural and Brain Sciences*, Vol. 20, pp. 723-767
- Bailey, David Robert. 1997. *When Push Comes to Shove: A Computational Model of the Role of Motor Control in the Acquisition of Action Verbs*, Ph.D Thesis, University of California Berkeley
- Bar-Hillel, Yehoshua. 1957. 'Husserl's Conception of a Purely Logical Grammar' in *Philosophy and Phenomenological Research*, Vol. 17, pp. 362-369
- Barsalou, Lawrence W.
- 1999a. 'Language Comprehension: Archival Memory or Preparation for Situated Action' in *Discourse Processes*, Vol. 28, pp. 61-80
 - 1999b. 'Perceptual Symbol Symbols' in *Behavioural and Brain Sciences*, Vol. 22, pp. 577-660
- Beer. 2003. 'The Dynamics of Active Categorical Perception in an Evolved Model Agent' in *Adaptive Behaviour*, Vol. 11, pp. 209-43
- Bergan, Benjamin, and Nancy Chang. 2005. 'Embodied Construction Grammar in Simulation-Based Language Understanding' in *Construction grammars: Cognitive grounding and theoretical extensions*, pp. 147-190
- Bergan, Benjamin, Nancy Chang, and Shweta Narayan. 2004. 'Simulated Action in an Embodied Construction Grammar' in *Proceedings of the Twenty-Sixth Annual Conference of the Cognitive Science Society*, pp. 108-113
- Bergan, Benjamin, Ting-Ting Chan Lau, Shweta Narayan, Diana Stojanovic and Kathryn Wheeler. 2010. 'Body Part Representations in Verbal Semantics' in *Memory and Cognition*, Vol. 38, pp. 969-981
- Bergan, Benjamin, Shweta Narayan, and Jerome Feldman. 2003. 'Embodied Verbal Semantics: Evidence from an Image-Verb Matching Task' in *Proceedings of the 25th Annual Meeting of the Cognitive Science Society*, edited by Richard Alterman and David Kirsh [Boston, Cognitive Science Society]
- Bergan, Benjamin, and Kathryn Wheeler.
- 2009. 'Grammatical Aspect and Mental Simulation' in *Brand and Language* [reprinted online]
 - 2005. 'Sentence Understanding Engages Motor Processes' in *Proceedings of the Twenty-Seventh Annual Conference of the Cognitive Science Society*
- Berwick, Robert C., Paul Pietroski, Beracah Yankama, and Noam Chomsky. 2011. 'Poverty of the Stimulus Revisited' in *Cognitive Science*, Vol. 35, pp. 1207-1242
- Besmer, Kirk M. 2007. *Merleau-Ponty's Phenomenology* [London, Continuum]

- Bever, T. G, J. R. Lackner, and R. Kirk. 1969. 'The Underlying Structures of Sentences are the Primary Units of Immediate Speech Processing' in *Perception and Psychophysics*, Vol. 5, pp. 225-234
- Bichakjian, Bernard H. 2012. 'Language: From Sensory Mapping to Cognitive Construct' in *Biolinguistics*, Vol. 6, pp. 247-258
- Blattner, William.
- 2006a. *Heidegger's Being and Time* [London, Continuum]
 - 2006b. 'Laying the Ground for Metaphysics: Heidegger's Appropriation of Kant' in *The Cambridge Companion to Heidegger* [Cambridge, Cambridge University Press]
 - 1999. *Heidegger's Temporal Idealism* [Cambridge, Cambridge University Press]
- Boeckx, Cedric. 2006. *Linguistic Minimalism: Origins, Concepts, Methods, and Aims* [Oxford, Oxford University Press]
- Boeckx, Cedric and Kleanthes K. Grohmann. 2007. 'Remark: Putting Phases into Perspective' in *Syntax*, Vol. 10, pp. 204-222
- Boogaart, Ronny and Theo Janssen. 2007. 'Tense and Aspect' in *The Oxford Handbook of Cognitive Linguistics*, edited by Dirk Geeraerts and Hubert Cuyckens [Oxford, Oxford University Press]
- Boroditsky, Lera.
- 2002. 'Comparison and the Development of Knowledge' in *Cognition*, Vol. 102, pp. 118-128
 - 2001. 'Does Language Shape Thought? Mandarin and English Speaker's Conception of Time' in *Cognition*, Vol. 43, pp. 1-22
 - 2000. 'Metaphoric Structuring: Understanding Time Through Spatial Metaphors' in *Cognition*, Vol. 75, pp. 1-28
- Boroditsky, L. and W. Phillips. 2002. 'Can Quirks of Grammar Affect the Way You Think? Grammatical Gender and Object Concepts' [<http://csjarchive.cogsci.rpi.edu/Proceedings/2003/mac/prof180.html>]
- Boroditsky, L., L. Schmidt, and W. Phillips. 2003. 'Sex, Syntax, and Semantics' in *Advances in the Study of Language and Thought*, edited by D. Gentner and S. Goldin-Meadow [Cambridge, MIT Press]
- Boysen, S. T., G. G. Berston, M. B. Hannan, and J. T. Cacioppo. 1996. 'Quantity-Based Inference and Symbolic Representations in Chimpanzees (*Pan troglodytes*)' in *Journal of Experimental Psychology*, Vol. 22, pp. 76-86
- Brooks, Rodney A., Cynthia Breazeal, Matthew Marjanovic, Brian Scassellati, Matthew M. Williamson. 1999. 'The Cog Project: Building a Humanoid Robot' in *Computation for Metaphors, Analogy and Agents*, Vol. 1562 of Springer Lecture Notes in Artificial Intelligence
- Brugman, Claudia. 1983. 'The Use of Body-Part Terms as Locatives in Chalcatongo Mixtec' in *Studies in Mesoamerican Linguistics: Report #4 of Survey of California and Other Indian Languages*, pp. 235-290
- Bruzina, Ronald. 2004. *Edmund Husserl and Eugen Fink: Beginnings and Ends in Phenomenology 1928-1938* [New Haven, Yale University Press]
- Butler, Judith. 2006. 'Merleau-Ponty and the Touch of Malebranche' in *The Cambridge Companion to Merleau-Ponty*, edited by Taylor Carmen and Mark B. N. Hansen [Cambridge, Cambridge University Press]
- Buttleman, David, Malinda Carpenter, Josep Call and Michael Tomasello. 2007. 'Enculturated Chimpanzees Imitate Rationally' in *Developmental Science*, Vol. 10, pp. F31-38
- Buzsáki, György, and James J. Chrobak. 1995. 'Temporal Structure in Spatially Organized Neuronal Ensembles: a Role for Interneuronal Networks' in *Current Opinion in Neurobiology*, Vol. 5, pp. 504-510

- Bybee, Joan, Revere Perkins, and William Pagliuca. 1994. *The Evolution of Grammar: Tense, Aspect, and Modality in the Languages of the World* [London, University of Chicago Press]
- Call, Joseph. 2004. 'Inferences About the Location of Food in the Great Apes (*Pan paniscus*, *Pan troglodytes*, *Gorilla gorilla*, *Pongo pygmaeus*)' in *Journal of Comparative Psychology*, Vol. 118, pp. 232-241
- Call, Josep and Michael Tomasello.
- 1994. 'Production and Comprehension of Referential Pointing by Orangutans (*Pongo pygmaeus*)' in *Journal of Comparative Psychology*, Vol. 108, pp. 307-317
 - 1998. 'Distinguishing Intentional From Accidental Actions in Orangutans (*Pongo pygmaeus*), Chimpanzees (*Pan troglodytes*), and Human Children (*Homo sapiens*)' in *Journal of Comparative Psychology*, Vol. 112, pp. 192-206
- Call, Josep, Brian Hare, Malinder Carpenter and Michael Tomasello. 2004. 'Unwilling' Versus 'Unable': Chimpanzees' Understanding of Human Intentional Action, Vol. 7, pp. 488-498
- Capirci, O., J. M. Iverson, E. Pizzuto, and V. Volterra. 1996. Gestures and Words During the Transition to Two-Word Speech' in *Journal of Child Language*, Vol. 23, pp. 645-673
- Carey, Susan and Fei Xu. 2001. 'Infant's Knowledge of Objects: Beyond Object Files and Object Tracking' in *Cognition*, Vol. 80, pp. 179-213
- Carman, Taylor.
- 2008. *Merleau-Ponty* [Oxford, Routledge]
 - 2006. 'Sensation, Judgement and the Phenomenal Field' in *The Cambridge Companion to Merleau-Ponty* [Cambridge, Cambridge University Press]
 - 1999. 'The Body in Husserl and Merleau-Ponty' in *Philosophical Topics*, Vol. 27, pp. 25-226
- Chang, Nancy. 1997. 'A Motor- and Image-Schematic Analysis of Aspectual Composition' in *Proceedings of the 5th International Cognitive Linguistics Association Conference*
- Chang, Nancy, Daniel Gildea, and Srini Narayanan. 1998. 'A Dynamic Model of Aspectual Composition' in *Proc. CogSci 98*
- Child, William. 2011. *Wittgenstein* [Oxford, Routledge]
- Chomsky, Noam.
- 2010. *Language and Mind: Third Edition* [Cambridge, Cambridge University Press]
 - 2009a. *Cartesian Linguistics* [Cambridge, Cambridge University Press]
 - 2009b. *The Architecture of Language*, edited by Nirmalangshu Mukherji, Bibudhendra Narayan Patnaik and Rama Kant Agnihotri [Oxford, Oxford University Press]
 - 2008. *On Nature and Language* [Cambridge, Cambridge University Press]
 - 2005a. 'On Phases' [http://www.fosssil.in/Chomsky_Phases.pdf]
 - 2005b. *New Horizons in the Study of Language and Mind* [Cambridge, Cambridge University Press]
 - 2005c. 'Three Factors in Language Design' in *Linguistic Inquiry*, Vol. 36, pp. 1-22
 - 2004. 'Beyond Explanatory Adequacy' in *Structures and Beyond: The Cartography of Syntactic Structures (Volume 3)*, edited by Adriana Belletti [Oxford, Oxford University Press]
 - 2003. 'Reply to Millikan' in *Chomsky and his Critics* [Oxford, Blackwell]
 - 2002. *Syntactic Structures* [Berlin, Mouton de Gruyter]
 - 2001. 'Derivation by Phase' in *Ken Hale: A Life in Language*, edited by Michael Kenstowicz [Cambridge MA, MIT Press]
 - 1995. *The Minimalist Program* [Cambridge MA, MIT Press]
 - 1993. *Language and Thought* [London, Moyer Bell]
 - 1986. *Knowledge of Language: Its Nature, Origin and Use* [New York, Praeger]
 - 1981. *Lectures on Government and Binding: The Pisa Lectures* [Berlin, Mouton de Gruyter]
 - 1977. 'Conditions on Transformations' in *A Festschrift for Morris Halle*, edited by Stephen R. Anderson and Paul Kiparsky, reprinted in *Essays on Form and Interpretation* [New York, North-Holland]

- 1971. 'The Case Against B. F. Skinner' in *The New York Review of Books* [07/06/12, <http://www.ehu.es/HEB/KEPA/The%20Case%20Against%20B.F.%20Skinner.pdf>]
 - 1965. *Aspects of the Theory of Syntax* [Cambridge MA, MIT Press]
 - 1959. 'A Review of Verbal Behaviour' in *Language*, Vol. 35, No. 1, pp. 26-58
 - 1956. 'Three Models for the Description of Language' in *IRE Transactions on Information Theory*, Vol. 2, pp. 113-124
- Christiansen, Morten H., and Nick Chater.
- 1999a. 'Connectionist Natural Language Processing: The State of the Art' in *Cognitive Science*, Vol. 23, pp. 417-437
 - 1999b. 'Toward a Connectionist Model of Recursion in Human Linguistic Performance' in *Cognitive Science*, Vol. 23, pp. 157-205
- Clark, Andy.
- 2011. *Supersizing the Mind: Embodiment, Action and Cognitive Extension* [Oxford, Oxford University Press]
 - 2001. *Mindware: An Introduction to the Philosophy of Cognitive Science* [Oxford, Oxford University Press]
 - 1998. 'Magic Words: How Language Augments Human Computation' in *Language and Thought: Interdisciplinary Themes* [Cambridge, Cambridge University Press], reprinted online [11/06/2012, <http://www.philosophy.ed.ac.uk/people/clark/pubs/magic.pdf>]
 - 1997. *Being There: Putting Brain, Body and World Together Again* [Oxford, Blackwell]
 - 1997b. 'Economic Reason: The Interplay of Individual Learning and External Structure' in *The Frontiers of the New Institutional Economics*, edited by John N. Drobak and John V. C. Nye [Academic Press]
 - 1996. 'Linguistic Anchors in a Sea of Thought' in *Pragmatics and Cognition*, Vol. 4, No. 1, pp. 93-103, reprinted online [12/06/2012, <http://www.philosophy.ed.ac.uk/people/clark/pubs/linguist.pdf>]
- Clark, Andy and David Chalmers. 1998. 'The Extended Mind' in *Analysis*, Vol. 58, pp. 7-19
- Collier, Mark, and Bill Manley. 1998. *How to Read Egyptian Hieroglyphs* [Berkley, University of California Press]
- Comrie, Bernard. 1976. *Aspect: An Introduction to the Study of Verbal Aspect and Related Problems* [Cambridge, Cambridge University Press]
- Cooper, David E. 2004. *Existentialism: A Reconstruction* [Oxford, Blackwell]
- Cordemoy, Geraud du. 1668. *A Philosophical Discourse Concerning Speech, Conformable to the Cartesian Principles* [Royal Society]
- Cottingham, John. 2008. *Cartesian Reflections: Essays on Descartes' Philosophy* [Oxford, Oxford University Press]
- Crick, Francis. 1996. 'Visual Perception: Rivalry and Consciousness' in *Nature*, Vol. 379, pp. 485-6
- Croft, William. 1998. 'The Structure of Events and the Structure of Language' in *The New Psychology of Language*, edited by Michael Tomasello [London, Taylor and Francis]
- Dahlstrom, Daniel. 2010. 'The Critique of Pure Reason and Continental Philosophy: Heidegger's Interpretation of Transcendental Imagination' in *The Cambridge Companion to Kant's Critique of Pure Reason*, edited by Paul Guyer [Cambridge, Cambridge University Press]
- Dennett, Daniel. 1993. *Consciousness Explained* [London, Penguin]
- Descartes, Rene.
- 1997a. 'Meditations on First Philosophy' in *Key Philosophical Writings*, translated by Elizabeth S. Haldane and G. R. T. Ross [Hertfordshire, Wordsworth Editions]
 - 1997b. 'The Passions of the Soul' in *Key Philosophical Writings*, translated by Elizabeth S. Haldane and G. R. T. Ross [Hertfordshire, Wordsworth Editions]
 - 1997c. 'Principles of Philosophy' in *Key Philosophical Writings*, translated by Elizabeth S. Haldane and G. R. T. Ross [Hertfordshire, Wordsworth Editions]

- 1985a. 'Discourse on the Method' in *The Philosophical Writings of Descartes: Volume I*, translated by John Cottingham, Robert Stoothoff and Dugald Murdoch [Cambridge, Cambridge University Press]
 - 1985b. 'Optics' in *The Philosophical Writings of Descartes: Volume I*, translated by John Cottingham, Robert Stoothoff and Dugald Murdoch [Cambridge, Cambridge University Press]
 - 1985c. 'Rules for the Direction of the Mind' in *The Philosophical Writings of Descartes: Volume I*, translated by John Cottingham, Robert Stoothoff and Dugald Murdoch [Cambridge, Cambridge University Press]
 - 1970. *Philosophical Letters*, translated and edited by Anthony Kenny [Oxford, Clarendon Press]
 - 1952. *Descartes' Philosophical Writings*, translated by Norman Kemp Smith [London, Macmillan]
- Diesendruck, Gil, Lori Markson, Nameera Akhtar and Ayelet Reudor. 2004. 'Two-Year-Olds' Sensitivity to Speakers' Intent: An Alternative Account of Samuelson and Smith' in *Developmental Science*, Vol. 7, No. 1, pp. 33-41
- Dooling, Robert J., Catharine T. Best, and Susan D. Brown. 1995. 'Discrimination of Synthetic Full-Format and Sinewave /ra-la/ Continua by Budgerigars (*Melopsittacus undulatus*) and Zebra Finches (*Taeniopygia guttata*)' *Journal of the Acoustic Society of America*, Vol. 97, No. 3, pp. 1839-1846
- Dorstal, Robert J. 2006. 'Time and Phenomenology in Husserl and Heidegger' in *The Cambridge Companion to Heidegger*, edited Charles B. Guignon [Cambridge, Cambridge University Press]
- Dowty, David R. 1977. 'Toward a Semantic Analysis of Verb Aspect and the English 'Imperfective' Progressive' in *Linguistics and Philosophy*, Vol. 1, pp. 45-77
- Duffy, Kimberly G., Richard W. Wrangham, and Joan B. Silk. 2007. 'Male Chimpanzees Exchange Political Support for Mating Opportunities' in *Current Biology*, Vol. 17, No. 15, pp. R586-587
- Duncan, Susan. 2002. 'Gesture, Verb Aspect, and the Nature of Iconic Imagery in Natural Discourse' in *Gesture*, Vol. 2, pp. 183-206
- Elman, Jeffrey L.
- 1995. 'Language as a Dynamical System' in *Mind as Motion: Explorations in the Dynamics of Cognition*, edited by Robert Frederick Port and Tim van Gelder [Cambridge MA, MIT Press], reprinted at <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.50.7356&rep=rep1&type=pdf>
 - 1991. 'Distributed Representations, Simple Recurrent Networks, and Grammatical Structure' in *Machine Learning*, Vol. 7, pp. 195-225
 - 1989. 'Representation and Structure in Connectionist Models' in *CRL Technical Report 8903* [San Diego, University of California]
- Evans, Christopher, Linda Evans, and Peter Marler. 1993. 'On the Meaning of Alarm Calls: Functional Reference in an Avian Vocal System' in *Animal Behaviour*, Vol. 46, pp. 23-38
- Everett, Daniel L. 2005. 'Cultural Constraints on Grammar and Cognition in Pirahã: Another Look at the Design Features of Human Language' in *Current Anthropology*, Vol. 46, pp. 621-646
- Farber, Marvin. 1966. *The Aims of Phenomenology: The Motives, Methods, and Impact of Husserl's Thought* [New York, Harper and Row]
- Fausey, Caitlin M., and Teenie Matlock. 2011. 'Can Grammar Win Elections?' in *Political Psychology*, Vol. 32, pp. 563-574
- Fay, Michael J. and Richard W. Carroll. 1994. 'Chimpanzee Tool Use for Honey and Termite Extraction in Central Africa' in *American Journal of Primatology*, Vol. 34, pp. 309-317
- Feldman, Jerome. 2008. *From Molecule to Metaphor: A Neural Theory of Language* [Cambridge MA, MIT Press]

- Feldman, Jerome and Srinivas Narayanan. 2004. 'Embodied Meaning in a Neural Theory of Language' in *Brain and Language*, Vol. 89, pp. 385-392
- Fillenbaum. 1971. 'Psycholinguistics' in *Annual Review of Psychology*, Vol. 22, pp. 251-308
- Fitch, Tecumseh, Marc D. Hauser, and Noam Chomsky. 2005. 'The Evolution of the Language Faculty: Clarifications and Implications' in *Cognition*, Vol. 97, pp. 179-210
- Fitzpatrick, Paul and Artur Arsenio. 2004. 'Feel the Beat: Using Cross Modal Rhythm to Integrate Perception of Objects, Others, and Self' in *Proceedings of the Fourth International Workshop on Epigenetic Robots*, edited by L. Berthouze, H. Kozima, C. G. Prince, G. Sandini, G. Stojanov, G. Metta, and C. Balkenius [Lund, Lund University Cognitive Studies]
- Flynn, Bernard. 2011. 'Maurice Merleau-Ponty' in *The Stanford Encyclopaedia of Philosophy*, edited by Edward N. Zalta [<http://plato.stanford.edu/archives/fall2011/entries/merleau-ponty/>]
- Fodor, Jerry.
- 2008. *LOT 2: The Language of Thought Revisited* [Oxford, Oxford University Press]
 - 1991. 'Methodological Solipsism Considered as a Research Strategy in Cognitive Psychology' in *The Philosophy of Science*, edited by Richard Boyd, Philip Gasper and J. D. Trout [Cambridge MA, MIT Press]
- Fodor, J., and T. G. Bever. 1965. 'The Psychological Reality of Linguistic Structure' in *Journal of Verbal Learning and Verbal Behaviour*, Vol. 4, pp. 414-420
- Fogelin, Robert J. 2005. 'Wittgenstein's Critique of Philosophy' in *The Cambridge Companion to Wittgenstein*, edited by Hans Sluga and David G. Stern [Cambridge, Cambridge University Press]
- Føllesdal, Dagfinn. 1982. 'Husserl's Notion of Noema' in *Husserl, Intentionality and Cognitive Science*, edited by Hubert Dreyfus [London, MIT Press]
- Franks, Paul. 2005. 'All or Nothing: Systematicity and Nihilism in Jacobi, Reinhold, and Maimon' in *The Cambridge Companion to German Idealism* [Cambridge, Cambridge University Press]
- Frith, Chris, A. Lawrence, and D. Weinberger. 1996. 'The Role of the Prefrontal Cortex in Self-Consciousness: The Case of Auditory Hallucinations and Discussion' in *Philosophical Transactions: Biological Sciences*, Vol. 351, pp. 1505-1512
- Gabarini, Francesca and Mauro Adenzato. 2004. 'At the Root of Embodied Cognition: Cognitive Science Meets Neurophysiology' in *Brain and Cognition*, Vol. 56, pp. 100-6
- Gallagher, Shaun. 2006. *How the Body Shapes the Mind* [Oxford, Oxford University Press]
- Gallagher, Shaun and Dan Zahavi. 2010. *The Phenomenological Mind: An Introduction to Philosophy of Mind and Cognitive Science* [London, Routledge]
- Gallese, Vittorio and George Lakoff. 2005. 'The Brain's Concepts: The Role of the Brain's Sensorimotor System in Reason and Language' in *Cognitive Neuropsychology*, Vol. 22, pp. 455-79
- Gardner, Sebastian. 1999. *Kant and the Critique of Pure Reason* [London, Routledge]
- Garrett, Merrill, Tom Bever, and Jerry Fodor. 1966. 'The Active Use of Grammar in Speech Perception' in *Perception and Psychophysics*, Vol. 1, pp. 30-2
- Gauker, Christopher. 1990. 'How to Learn Language Like a Chimpanzee' in *Philosophical Psychology*, Vol. 3, pp. 31-54
- Gibson, James J. 1979. *The Ecological Approach to Visual Perception* [London, Houghton Mifflin Company]
- Gleick, James. 2012. *The Information: A History, A Theory, A Flood* [London, Fourth Estate]
- Glenberg, Arthur M. 1999. 'Perceptual Symbols in Language Comprehension' in *Brain and Behavioural Sciences*, Vol. 22(4), pp. 618-9
- Glenberg, A., D. Havas, R. Becker, and M. Rinck. 2005. 'Grounding Language in Bodily States: The Case for Emotion' in *The Grounding of Cognition: The Role of Perception and Action in Memory, Language, and Thinking*, edited by R. Zwaan and D. Pecher [Cambridge, Cambridge University Press]

- Glenberg, A., and M. Kaschak. 2002. 'Grounding Language in Action' in *Psychonomic Bulletin & Review*, Vol. 9, pp. 558-65
- Glenberg, Arthur M., and David A. Robertson. 2000. 'Symbol Grounding and Meaning: A Comparison of High-Dimensional and Embodied Theories of Meaning' in *Journal of Memory and Language*, Vol. 43, pp. 379-401
- Gode, Dhananjay K., and Shyam Sunder. 1993. 'Allocative Efficiency of Markets with Zero Intelligence Traders: Market as a Partial Substitute for Individual Rationality' in *The Journal of Political Economy*, Vol. 101, pp. 119-137
- Gordon, Peter. 2004. 'Numerical Cognition Without Words: Evidence from Amazonia' in *Science*, Vol. 306, pp. 496-499
- Gorner, Paul. 2010. 'Heidegger's Phenomenology as Transcendental Philosophy' in *International Journal of Philosophical Studies*, Vol. 10, pp. 17-33
- Grimshaw, Jane. 1991. *Argument Structure* [London, MIT Press]
- Guyer, Paul.
- 2010. 'The Deduction of the Categories: The Metaphysical and Transcendental Deductions' in *The Cambridge Companion to Kant's Critique of Pure Reason* [Cambridge, Cambridge University Press]
 - 2006. *Kant* [London, Routledge]
 - 2005. 'Absolute Idealism and the Rejection of Kantian Dualism' in *The Cambridge Companion to German Idealism*, edited by Karl Americks [Cambridge, Cambridge University Press]
- Hale, Ken. 1983. 'Warlpiri and the Grammar of Non-Configurational Languages' in *Natural Language and Linguistic Theory*, Vol. 1, pp. 5-47
- Hare, Brian, Josep Call, Bryan Agnetta and Michael Tomasello. 2000. 'Chimpanzees Know What Conspecifics do and do not See' in *Animal Behaviour*, Vol. 59, pp. 771-785
- Hare, Brian, Josep Call and Michael Tomasello. 2001. 'Do Chimpanzees Know What Conspecifics Know?' in *Animal Behaviour*, Vol. 61, pp. 139-151
- Hare, Brian and Michael Tomasello. 2004. 'Chimpanzees are More Skilful in Competitive than in Cooperative Cognitive Tasks' in *Animal Behaviour*, Vol. 68, pp. 571-581
- Harris, Randy Allen. 1993. *The Linguistics Wars* [Oxford, Oxford University Press]
- Hauser, Marc D., Noam Chomsky, and Tecumseh Fitch. 2002. 'The Faculty of Language: What Is It, Who Has It, and How Did It Evolve?' in *Science*, Vol. 298, pp. 1569-1579
- Hayek, Friedrich August von. 2009. 'The Use of Knowledge in Society' in *Individualism and Economic Order* [Auburn AL, Ludwig von Mises Institute]
- Heidegger, Martin.
- 2009. *Pathmarks*, edited by William McNeill [Cambridge, Cambridge University Press]
 - 2006. *Being and Time*, translated by John Macquarrie and Edward Robinson [Oxford, Blackwell]
 - 2003. *What is Philosophy?*, translated by Jean T. Wilde and William Kluback [Oxford, Rowman and Littlefield]
 - 2002. 'The Origin of the Work of Art' in *Off the Beaten Track*, edited by Julian Young and Kenneth Haynes [Cambridge, Cambridge University Press]
 - 2001. *Zollikon Seminars: Protocols - Conversations - Letters*, edited by Medard Boss, translated by Franz Mayr and Richard Askay [Evanston, Northwestern University Press]
 - 1997a. *Kant and the Problem of Metaphysics*, translated by Richard Taft [Indianapolis, Indiana University Press]
 - 1997b. *Phenomenological Interpretation of Kant's Critique of Pure Reason*, translated by Parvis Emad and Kenneth Maly [Indianapolis, Indiana University Press]
 - 1995. *The Fundamental Concepts of Metaphysics: World, Finitude, Solitude*, translated by William McNeill and Nicholas Walker [Indianapolis, Indiana University Press]
 - 1994. *Basic Questions of Philosophy: Selected 'Problems' of 'Logic'*, translated by Richard Rojcewicz and Andre Schuwer [Indianapolis, Indiana University Press]

- 1992a. *History of the Concept of Time: Prolegomena*, translated by Theodore Kisiel [Bloomington, Indiana University Press]
 - 1992b. *The Metaphysical Foundations of Logic*, translated by Michael Heim [Bloomington, Indiana University Press]
 - 1988. *The Basic Problems of Phenomenology*, translated by Albert Hofstadter [Indianapolis, Indiana University Press]
- Hinzen, Wolfram.
- 2007. *An Essay on Names and Truth* [Oxford, Oxford University Press]
 - 2006. *Mind Design and Minimal Syntax* [Oxford, Oxford University Press]
- Hinzen, Wolfram and Michelle Sheehan. Forthcoming. *The Philosophy of Universal Grammar* [Oxford, Oxford University Press]
- Hintikka, Jaakko. 2006. 'The Phenomenological Dimension' in *The Cambridge Companion to Husserl* [Cambridge, Cambridge University Press]
- Holdcroft, David. 2008. 'Structuralism in Linguistics' in *The Routledge Encyclopaedia of Philosophy* [17/05/2008, <http://www.rep.routledge.com/article/U044>]
- Hopkins, Burt C. 2011. *The Philosophy of Husserl* [Durham, Acumen]
- Hostetter, Autumn B. and Martha W. Alibali.
- 2010. 'Language, Gesture, Action! A Test of the Gesture as Simulated Action Framework' in *Journal of Memory and Language*, Vol. 63, pp. 245-257
 - 2008. 'Visible Embodiment: Gestures as Simulated Action' in *Psychonomic Bulletin and Review*, Vol. 15, pp. 495-514
- Humboldt, Wilhelm von. 1999. *The Diversity of the Human Language Structure and its Influence on the Mental Development of Mankind*, translated by Peter Heath [Cambridge, Cambridge University Press]
- Husserl, Edmund.
- 2001a. *Logical Investigations: Volume I*, translated by J. N. Findlay [London, Routledge]
 - 2001b. *Logical Investigations: Volume II*, translated by J. N. Findlay [London, Routledge]
 - 1999. *Cartesian Meditations: An Introduction to Phenomenology*, translated by Dorion Cairns [London, Springer]
 - 1991. *On the Phenomenology of the Consciousness of Internal Time*, translated by John Barnet Brough [London, Kluwer Academic Publishers]
 - 1989. *Ideas Pertaining to a Pure Phenomenology and Phenomenological Philosophy: Studies in the Phenomenology of Constitution (Second Book)*, translated by R. Rojcewicz and A. Schuwer [London, Kluwer Academic Publishers]
 - 1983. *Ideas Pertaining to a Pure Phenomenology and Phenomenological Philosophy: General Introduction to a Pure Phenomenology (First Book)*, translated by F. Kersten [London, Kluwer Academic Publishers]
 - 1980. *Ideas Pertaining to a Pure Phenomenology and Phenomenological Philosophy: General Introduction to a Pure Phenomenology (Third Book)*, translated by Ted E. Klein and William E. Pohl [London, Martinus Nijhoff Publishers]
 - 1973. *The Crisis of European Sciences and Transcendental Phenomenology: An Introduction to Phenomenological Philosophy*, translated by David Carr [Evanston, Northwestern University Press]
- Inwood, Michael. 2000. *Heidegger* [Oxford, Oxford University Press]
- Iverson, Jana M., and Susan Goldin-Meadow. 2005. 'Gesture Paves the Way for Language Development' in *Psychological Science*, Vol. 16, pp.367-373
- Jackendoff, Ray.
- 2007. *Language, Consciousness, Culture: Essays on Mental Structure* [London, MIT Press]
 - 2003. *Foundations of Language: Brain, Meaning, Grammar, Evolution* [Oxford, Oxford University Press]
 - 1996. 'How Language Helps Us Think' in *Pragmatics and Cognition*, Vol. 4, No. 1, pp. 1-34

- Jakobson, Roman. 1966. 'On Linguistic Aspects of Translation' in *On Translation*, edited by Reuben A. Brower [New York, Oxford University Press]
- Johnson-Laird, P. N. 1974. 'Experimental Psycholinguistics' in *Annual Review of Psychology*, Vol. 12, pp. 135-160
- Kaminski, Julliane, Josep Call and Michael Tomasello. 2004. 'Body Orientation and Face Orientation: Two Factors Controlling Apes' Begging Behaviour from Humans' in *Animal Cognition*, Vol. 7, pp. 216-223
- Kant, Immanuel. 1996. *Critique of Pure Reason*, translated by Werner S. Pluhar [Indianapolis, Hackett]
- Kashak, Michael P. and Arthur M. Glenberg. 2000. 'Constructing Meaning: The Role of Affordances and Grammatical Constructions in Sentence Comprehension' in *Journal of Memory and Language*, Vol. 43, pp. 508-529
- Käufer, Stephan. 2003. 'Schemata, Hammers, and Time: Heidegger's Two Derivations of Judgement' in *Topoi*, Vol. 22, pp. 79-91
- Kita, Sotaro and Asli Özyürek. 2003. 'What does Cross-Linguistic Variation in Semantic Coordination of Speech and Gesture Reveal?: Evidence for an Interface Representation of Spatial Representation and Thinking' in *Journal of Memory and Language*, Vol. 48, pp. 16-32
- Kluender, Keith R., Randy L. Diehl, and Peter R. Killeen. 1987. 'Japanese Quail Can Learn Phonetic Categories' in *Science*, Vol. 237, No. 4819, pp. 1195-1197
- Kluender, Keith R., Andrew J. Lotto, Lori L. Holt, and Suzi L. Bloedel. 1998. 'Role of Experience for Language-Specific Functional Mappings of Vowel Sounds' in *Journal of the Acoustic Society of American*, Vol. 104, No. 6, pp. 3568-3582
- Konishi, Toshi. 1993. 'The Semantics of Grammatical Gender: A Cross-Cultural Study' in *Journal of Psycholinguistic Research*, Vol. 22, pp. 519-534
- Koskela, Jani. 2012. 'Truth as Unconcealment in Heidegger's Being and Time' in *Minerva*, Vol. 16, pp. 116-128
- Kuhl, Patricia K. and James D. Miller. 1975. 'Speech Perception by the Chinchilla: Voice-Voiceless Distinction in Alveolar Plosive Consonants' in *Science*, Vol. 190, No. 4209, pp. 69-72
- Kuhl, Patricia K. and Denise M. Padden. 1982. 'Enhanced Discriminability at the Phonetic Boundaries for the Voicing Features in Macaques' in *Perception and Psychophysics*, Vol. 32, No. 6, pp. 542-550
- Kusch, Martin. 1989. *Language as Calculus VS. Language as Universal Medium: A Study in Husserl, Heidegger and Gadamer* [London, Kluwer Academic Publishers]
- Lakoff, George.
- 2003. 'How the Body Shapes Thought: Thinking With an All-Too Human Brain' and 'How to Live With an Embodied Mind: When Causation, Mathematics, Morality, the Soul, and God are Essentially Metaphorical Ideas' in *The Nature and Limits of Human Understanding: The 2001 Gifford Lectures at the University of Glasgow*, edited by A. Sanford [Edinburgh, T. & T. Clark Publishers]
 - 1987. *Women, Fire, and Dangerous Things: What Categories Reveal About the Mind* [London, University of Chicago Press]
- Lakoff, George and Mark Johnson.
- 2003. *Metaphors we Live By* [Chicago, University of Chicago Press]
 - 1999. *Philosophy in the Flesh: The Embodied Mind and Its Challenge to Western Thought* [New York, Basic Books]
- Lakoff, George and Rafael E. Núñez. 2000. *Where Mathematics Comes From: How the Embodied Mind Brings Mathematics in Being* [New York, Basic Books]
- Langacker, Ronald W. 1990. *Concept, Image, and Symbol: The Cognitive Basis of Grammar* [Berlin, Mouton de Gruyter]

- Leavens, David A. and William D. Hopkins. 1998. 'Intentional Communication in Chimpanzees: A Cross-Sectional Study of the Use of Referential Gestures' in *Developmental Psychology*, Vol. 34, pp. 813-822
- Leavens, David A., William D. Hopkins, and Kim A. Bard. 2005. 'Understanding the Point of Chimpanzee Pointing: Epigenesis and Ecological Validity' in *Current Directions in Psychological Science*, Vol. 14, pp. 185-189
- Lewis, John D., and Jeffrey Elman. 2001. 'A Connectionist Investigation of Linguistic Arguments from Poverty of the Stimulus: Learning the Unlearnable' in *Proceedings of the Twenty-Third Annual Conference of the Cognitive Sciences Society*, pp. 552-557
- Liebal, Katja, Josep Call, and Michael Tomasello. 2004a. 'Use of Gesture Sequences in Chimpanzees' in *American Journal of Primatology*, Vol. 64, pp. 377-396
- Liebal, Katja, Josep Call, Michael Tomasello and Simone Pika. 2004b. 'To Move or not to Move: How Apes Adjust to the Attentional State of Others' in *Interaction Studies*, Vol. 5, pp.199-219
- Liebal, Katja, Simone Pika, and Michael Tomasello. 2006. 'Gestural Communication of Orangutans (*Pongo pygmaeus*)' in *Gesture*, Vol. 6, pp. 1-38
- Lokhorst, Gert-Jan. 2011. 'Descartes and the Pineal Gland' in *The Stanford Encyclopaedia of Philosophy*, edited by Edward N. Zalta [<http://plato.stanford.edu/archives/sum2011/entries/pineal-gland>]
- Madden, Carol J. and Rolf A. Zwaan. 2003. 'How does Verb Aspect Constrain Event Representations?' in *Memory and Cognition*, Vol. 31, pp. 663-672
- Man, John. 2009. *Alpha Beta: How Our Alphabet Shaped the Western World* [London, Bantam Books]
- Martin, Alex, James V. Haxby, Francois M. Lalonde, Cheri L. Wiggs, and Leslie G. Ungerleider. 1995. 'Discrete Cortical Regions Associated with Knowledge of Colour and Knowledge of Action' in *Science*, Vol. 270, pp. 102-105
- Mataric, Mata J. 1990. 'Navigating With a Rat Brain: A Neurobiologically Inspired Model for Robot Spatial Representation' in *Proceedings of the First International Conference on Simulation of Adaptive Behaviour*, pp. 169-175
- Matlock, Teenie.
- 2011. 'The Conceptual Motivation of Aspect' in *Motivation in Grammar and the Lexicon*, edited by Klaus-Uwe Panther and Gunter Radden [Netherlands, John Benjamins]
 - 2010. 'Abstract Motion is no Longer Abstract' in *Language and Cognition*, Vol. 2, pp. 243-260
- Matthews, Eric. 2006. *Merleau-Ponty: A Guide for the Perplexed* [London, Continuum]
- McGillvray, James. 2009. 'Introduction to the Third Edition' in *Cartesian Linguistics* (Chomsky: 2009)
- McNeil, David. 2003. 'Aspects of Aspect' in *Gesture*, Vol. 3, pp. 1-17
- Menary, Richard. 2007. 'Writing as Thinking' in *Language Sciences*, Vol. 29, pp. 621-632
- Merleau-Ponty, Maurice.
- 2006. *Phenomenology of Perception*, translated by Colin Smith [Oxford, Routledge]
 - 1973a. *Consciousness and the Acquisition of Language*, translated by Hugh J. Silverman [Evanstone, Northwestern University Press]
 - 1973b. *The Prose of the World*, translated by John O'Neill [Evanstone, Northwestern University Press]
 - 1968. *The Visible and the Invisible*, translated by Alphonso Lingis [Evanston, Northwestern University Press]
 - 1964a. *Sense and Nonsense*, translated by Hubert L. Dreyfus and Patricia Allen Dreyfus [Evanstone, Northwestern University Press]
 - 1964b. *Signs*, translated by Richard C. McCleary [Evanstone, Northwestern University Press]

- 1964c. 'An Unpublished Text by Maurice Merleau-Ponty: A Prospectus of his Work' in *The Primacy of Perception*, translated by Arleen B. Dallery [Evanstone, Northwestern University Press]
- 1964d. 'The Primacy of Perception' in *The Primacy of Perception*, translated by James M. Edie [Evanstone, Northwestern University Press]
- Mitani, John C., David P. Watts, and Sylvia J. Amsler. 2010. 'Lethal Intergroup Aggression Leads to Territorial Expansion in Wild Chimpanzees' in *Current Biology*, Vol. 20, No. 12, pp. R507-R508
- Mohanty, J. N. 2006. 'The Development of Husserl's Thought' in *The Cambridge Companion to Husserl* [Cambridge, Cambridge University Press]
- Moore, C., M. Angelopoulos and P. Bennett. 1999. 'Word Learning in the Context of Referential and Salience Cues' in *Developmental Psychology*, Vol. 35, No. 1, pp. 60-68
- Moran, Dermot. 2008. *Husserl: Founder of Phenomenology* [Cambridge, Polity Press]
- Morrison, Ronald P. 1978. 'Kant, Husserl, and Heidegger on Time and the Unity of Consciousness' in *Philosophy and Phenomenological Research*, Vol. 39, pp. 182-198
- Mulligan, Kevin. 2006. 'Perception' in *The Cambridge Companion to Husserl*, edited by Barry Smith and David Woodruff Smith [Cambridge, Cambridge University Press]
- Myowa-Yamakoshi, Masako and Tetsuro Matsuzawa. 2000. 'Imitation of Intentional Manipulatory Actions in Chimpanzees' in *Journal of Comparative Psychology*, Vol. 114, pp. 381-391
- Narayanan, Srin.
- 1997a. *Knowledge-Based Action Representations for Metaphor and Aspect*, Ph.D Thesis, University of California Berkeley
- 1997b. 'Talking the Talk is Like Walking the Walk: A Computational Model of Verbal Aspect' in *Proceedings of the Nineteenth Annual Conference of the Cognitive Science Society*
- Okamoto-Barth, Sanae, Josep Call and Michael Tomasello. 2007. 'Great Apes' Understanding of Other Individual's Line of Sight' in *Psychological Science*, Vol. 18, pp. 462-468
- Ozcaliskan and S. Goldin-Meadow. 2005. 'Gesture is at the Cutting Edge of Language Development' in *Cognition*, Vol. 96, pp. B101-113
- Panagiotidis, Phoevos. 2008. 'Diachronic Stability and Feature Interpretability' in *The Limits of Syntactic Variation*, edited by Teresa Biberauer [Amsterdam, John Benjamins]
- Parrill, Fey. 2010. 'Viewpoint in Speech-Gesture Integration: Linguistic Structure, Discourse Structure and Event Structure' in *Language and Cognitive Processes*, Vol. 25, pp. 650-668
- Parrill, Fey, Benjamin K. Bergman, and Patricia V. Lichtenstein. 2013. 'Grammatical Aspect, Gesture, and Conceptualisation: Using Co-Speech Gesture to Reveal Event Representations' in *Cognitive Linguistics*, Vol. 24, pp. 135-138
- Philipse, Herman. 2006. 'Transcendental Idealism' in *The Cambridge Companion to Husserl* [Cambridge, Cambridge University Press]
- Pika, Simone, and John Mitani. 2006. 'Referential Gestural Communication in Wild Chimpanzees' in *Current Biology*, Vol. 16, No. 6, pp. R191-R192
- Pinker, Steven.
- 1997. *How the Mind Works* [London, Penguin]
- 1995. *The Language Instinct: The New Science of Language and Mind* [London, Penguin]
- Pollick, Amy S. and Frans B. M. de Waal. 2007. 'Ape Gestures and Language Evolution' in *Proceedings of the National Academy of Sciences*, Vol. 104, pp. 8184-9189
- Pulvermüller, Friedemann, Werner Lutzenberger, and Hubert Preissel. 1999. 'Nouns and Verbs in the Intact Brain: Evidence from Event-Related Potentials and High-Frequency Cortical Responses' in *Cerebral Cortex*, Vol. 9, pp. 497-506
- Quine, Willard V. 1966. 'Meaning and Translation' in *On Translation*, edited by Reuben A. Brower [New York, Oxford University Press]

- Ramus, Franck, Marc D. Hauser, Cory Miller, Dylan Morris, and Jacque Mueller. 2000. 'Discrimination by Human Newborns and by Cotton-Top Tamarin Monkeys' in *Science*, Vol. 288, No. 5464, pp. 349-351
- Ratcliffe, Matthew. 2008. *Rethinking Folk Psychology: A Critique of Folk Psychology, Theory of Mind and Simulation* [London, Palgrave Macmillan]
- Rauh, Gisa. 2010. *Syntactic Categories: Their Identification and Description in Linguistic Theories* [Oxford, Oxford University Press]
- Richter, Duncan. 2004. *Wittgenstein at his Word* [London, Continuum]
- Rizzolatti, Giacomo and Michael A. Arbib. 1998. 'Language Within Our Grasp' in *Trends in Neuroscience*, Vol. 21, pp.188-194
- Rizzolatti and Craighero. 2004. 'The Mirror-Neuron System' in *Annual Review of Neuroscience*, Vol. 27, pp. 169-92
- Rock, Irvin, and Stephan Palmer. 1990. 'The Legacy of Gestalt Psychology' in *Scientific American*, Vol. 263, pp. 84-90
- Rodis-Lewis, Genevieve. 1998. 'Descartes and the Unity of the Human Being' in *Descartes*, edited by John Cottingham [Oxford, Oxford University Press]
- Rowlands, Mark. 1995. 'Against Methodological Solipsism: The Ecological Approach' in *Philosophical Psychology*, Vol. 8, pp. 5-24
- Russell, Bertrand. 2001. *The Problems of Philosophy* [Oxford, Oxford University Press]
- Samuelson, L. K. and L. B. Smith. 1998. 'Memory and Attention Make Smart Word Learning: An Alternative Account of Akhtar, Carpenter and Tomasello' in *Child Development*, Vol. 1, pp. 94-104
- Sartre, Jean-Paul. 1962. *Sketch for a Theory of Emotion*, translated by Philip Mairet [London, Methuen]
- Sato, Marc, Marisa Mengarilli, Lucia Riggio, Vittorio Gallese, and Giovanni Buccino. 2008. 'Task Related Modulation of the Motor System During Language Processing' in *Brain and Language*, Vol. 105, pp. 83-90
- Schmidt, James. 1985. *Maurice Merleau-Ponty: Between Phenomenology and Structuralism* [Hong Kong, Macmillan]
- Schutz, Alfred. 1953. 'Edmund Husserl's Ideas, Volume II' in *Philosophy and Phenomenological Research*, Vol. 13, pp. 394-413
- Sera, Maria D., Christian A. H. Berge, and Javier del Castillo Pintado. 1994. 'Grammatical and Conceptual Forces in the Attribution of Gender by Spanish and English Speakers' in *Cognitive Development*, Vol. 9, pp. 261-292
- Seyfarth, Robert M. and Dorothy L. Cheney. 2010. 'Behavioural Mechanisms Underlying Vocal Communication in Non-Human Primates' in *Animal Learning and Behaviour*, Vol. 25, No. 3, pp. 149-167
- Seyfarth, Robert M., Dorothy L. Cheney, Thore Bergman, Julia Fischer, Klaus Zuberbühler, and Kurt Hamerschmidt. 2010. 'The Central Importance of Information in Studies of Animal Communication' in *Animal Behaviour*, Vol. 80, pp. 3-8
- Shapiro, Lawrence.
- 2011. *Embodied Cognition* [Oxford, Routledge]
 - 2009. 'Making Sense of Mirror Neurons' in *Synthese*, Vol. 167, pp. 439-56
 - 2007. 'The Embodied Cognition Research Program' in *Philosophy Compass*, Vol. 2, pp. 338-46
- Simons, Peter. 2006. 'Meaning and Language' in *The Cambridge Companion to Husserl* [Cambridge, Cambridge University Press]
- Sinnott, Joan M. and Charles H. Brown. 1997. 'Perception of the American English Liquid /ra-la/ Contrast by Humans and Monkeys' in *Journal of the Acoustic Society of America*, Vol. 102, No. 1, pp. 588-602
- Skinner, B. F. 1957. *Verbal Behaviour* [New York, Appleton-Century-Crofts]

- Sluga, Hans. 2005. 'Ludwig Wittgenstein: Life and Work, An Introduction' in *The Cambridge Companion to Wittgenstein*, edited by Hans Sluga and David G. Stern [Cambridge, Cambridge University Press]
- Smith, Barry. 2006. 'Common Sense' in *The Cambridge Companion to Husserl*, edited by Barry Smith and David Woodruff Smith [Cambridge, Cambridge University Press]
- Smith, Barry and David Woodruff Smith. 2006. 'Introduction' in *The Cambridge Companion to Husserl*, edited by Barry Smith and David Woodruff Smith [Cambridge, Cambridge University Press]
- Smith, Neil. 2009. *Chomsky: Ideas and Ideals* [Cambridge, Cambridge University Press]
- Sommers, Mitchell S., David B. Moody, Cynthia A. Prosen, William C. Stebbins. 1992. 'Format Frequency Discrimination by Japanese Macaques (*Macaca fuscata*)' in *Journal of the Acoustic Society of America*, Vol. 91, No. 6, pp. 3499-3510
- Steedman, Mark. 1999. 'Connectionist Sentence Processing in Perspective' in *Cognitive Science*, Vol. 23 (4), pp. 615-643
- Stroop, J. Ridley. 1935. 'Studies if Interference in Serial Verbal Reactions' in the *Journal of Experimental Psychology*, Vol. XVIII, No. 6, pp. 643-662
- Taylor, Charles. 2006. 'Engaged Agency and Background in Heidegger' in *The Cambridge Companion to Heidegger*, edited by Charles B. Guignon [Cambridge, Cambridge University Press]
- Tettamanti, Marco, Giovanni Buccino, Maria Christina Saccuman, Vittorio Gallese, Massimo Danna, Paola Scifo, Ferruccio Fazio, Giacomo Rizzolatti, Stefano F. Cappa, and Daniela Perani. 2005. 'Listening to Action-Related Sentences Activates Fronto-Parietal Motor Circuits' in *Journal of Cognitive Neuroscience*, Vol. 17, pp. 273-281
- Tomasello, Michael.
- 2010. *The Origins of Human Communication* [London, MIT Press]
 - 2003a. *Constructing a Language: A Usage-Based Theory of Language Acquisition* [London, Harvard University Press]
 - 2003b. 'The Key is Social Cognition' in *Language in Mind: Advances in the Study of Language and Thought*, edited by Deirdre Gentner and Susan Goldwin-Meadow [London, MIT Press]
 - 2000. 'Do Young Children Have Adult Syntactic Competence?' in *Cognition*, Vol. 74, pp. 209-253
- Tomasello, M., J. Call, K. Nagell, R. Olguin, and M. Carpenter. 1994. 'The Learning and Use of Gestural Signs by Young Chimpanzees: A Transgenerational Study' in *Primates*, Vol. 35, pp. 137-154
- Tomasello, M., J. Call, and A. Gluckman. 1997. 'The Comprehension of Novel Communicative Signs by Apes and Human Children' in *Child Development*, Vol. 68, pp. 1067
- Tomasello, Michael and Malinda Carpenter. 2005. 'The Emergence of Social Cognition in Three Young Chimpanzees' in *Monographs of the Society for Research in Child Development*, Vol. 70, No. 1
- Tomasello, M., D. Gust, and T. Frost. 1989. 'A Longitudinal Investigation of Gestural Communication in Young Chimpanzees' in *Primates*, Vol. 30, pp. 35-50
- Tomasello, M., B. Hare and B. Agnetta. 1999. 'Chimpanzees, *Pan trogodytes*, Follow Gaze Direction Geometrically' in *Animal Behaviour*, Vol. 58, pp. 769-777
- Tranel, Daniel, Ralph Adolphs, Hanna Damasio, and Antonio R. Damasio. 2001. 'A Neural Basis for the Retrieval of Words for Actions' in *Cognitive Neuropsychology*, Vol. 18, pp. 655-670
- Tseng, Meylysa and Benjamin Bergen. 2005. 'Lexical Processing Drives Motor Simulation' in *Proceedings of the Twenty-Seventh Annual Conference of the Cognitive Science Society*
- Turner, Trevor. 1997. 'ABC of Mental Health: Schizophrenia' in *BMJ: British Medical Journal*, Vol. 315, No. 7100, pp. 108-111
- Van Gelder, Tim.

- 1998. 'The Dynamical Hypothesis in Cognitive Science' in *Behavioural and Brain Sciences*, Vol. 21, 615-65
 - 1995. 'What Might Cognition be, if not Computation?' in *Journal of Philosophy*, Vol. 92, 345-81
- Vendler, Zeno. 1967. *Linguistics in Philosophy* [Ithaca, Cornell University Press]
- Von der Marlsburg, Christolph. 1995. 'Binding in Models of Perception and Brain Function' in *Current Opinions in Neurobiology*, Vol. 5, pp. 520-526
- Von der Marlsburg, Christolph, and Joachim Buhmann. 1992. 'Sensory Segmentation with Coupled Neural Oscillators' in *Biological Cybernetics*, Vol. 67, pp. 233-242
- Vygotsky, Lev. 1993. *Thought and Language*, translated by Alex Kozulin [London, MIT Press]
- Warneken, Felix and Michael Tomasello. 2006. 'Altruistic Helping in Human Infants and Young Chimpanzees' in *Science*, Vol. 311, pp. 1301-1303
- Watson, John B. 1931. *Behaviourism* [London, Kegan Paul, Trench, Trubner and Co.]
- Watts, Michael. 2011. *The Philosophy of Heidegger* [Durham, Acumen]
- Willard, Dallas. 2006. 'Knowledge' in *The Cambridge Companion to Husserl* [Cambridge, Cambridge University Press]
- Woodruff Smith, David. 2006. 'Mind and Body' in *The Cambridge Companion to Husserl*, edited by Barry Smith and David Woodruff Smith [Cambridge, Cambridge University Press]
- Wigner, Eugene P. 1960. 'The Unreasonable Effectiveness of Mathematics in the Natural Sciences' in *Communications on Pure and Applied Mathematics*, Vol. XIII, pp.1-14
- Wiles, J., and J. Elman. 1995. 'Learning to Count Without a Counter: A Case Study of Dynamics and Activation Landscapes in Recurrent Networks' in *Proceedings of the Seventeenth Annual Meeting of the Cognitive Science Society*, pp. 335-339
- Wittgenstein, Ludwig.
- 2007. *Zettel* translated by G. E. M. Anscombe, edited by G. E. M. Anscombe and G. H. Wright [Los Angeles, University of California Press]
 - 2005. *Tractatus Logico-Philosophicus*, translated by D. F. Pears and B. F. McGuiness [Oxford, Routledge]
 - 2001. *Philosophical Investigations*, translated by G. E. M. Anscombe [Oxford, Blackwell]
 - 1975. *Philosophical Remarks*, translated by Raymond Hargreaves and Roger White [Oxford, Basil Blackwell]
 - 1980. *Culture and Value*, translated by Peter Winch [Oxford, Basil Blackwell]
- Zacks, Jeffrey M. and Barbara Tversky. 2001. 'Event Structure in Perception and Conception' in *Psychological Bulletin*, Vol. 127, pp. 3-21
- Zahavi, Dan. 2010. 'Naturalised Phenomenology' in *Handbook of Phenomenology and Cognitive Science*, edited by Shaun Gallagher and Daniel Schmiking [London, Springer]
- Zihl, J., D. von Crannon, and N. Mai. 1983. 'Selective Disturbance of Movement Vision After Bilateral Brain Damage' in *Brain*, Vol. 106, pp. 313-340